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**New York State Education Department**

BULLETIN 349 JULY 1905

# New York State Museum

John M. Clarke Director

Charles H. Peck State Botanist

**Bulletin 94**

**BOTANY 8**

# REPORT OF THE STATE BOTANIST 1904

| | PAGE |
|---|---|
| Introduction | 5 |
| Plants added to the herbarium | 9 |
| Contributors and contributions | 12 |
| Species not before reported | 19 |
| Remarks and observations | 35 |
| Edible fungi | 44 |
| Explanation of plates | 50 |
| Plates P, Q, R, 87-93 | follow 53 |
| Index | 55 |

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*New York State Education Department*
*Science Division, Jan. 16, 1905*

*Hon. Andrew S. Draper*
*Commissioner of Education:*

MY DEAR SIR: I have the honor of submitting to you the following report of work done in the botanical department of the State Museum for the year 1904.

Very respectfully yours
JOHN M. CLARKE
*Director*

*State of New York*
**Education Department**
COMMISSIONER'S ROOM
*Approved for publication Jan. 16, 1905*

A. S. Draper
*Commissioner of Education*

**New York State Education Department**

# New York State Museum

JOHN M. CLARKE Director
CHARLES H. PECK State Botanist

**Bulletin 94**

**BOTANY 8**

## REPORT OF THE STATE BOTANIST 1904

Specimens of plants for the state herbarium have been collected in the counties of Albany, Columbia, Essex, Fulton, Genesee, Hamilton, Lewis, Livingston, Madison, Monroe, Otsego, Rensselaer, Saratoga, Schenectady, Suffolk, Tompkins, Warren and Wyoming.

Specimens have been contributed that were collected in the counties of Albany, Cattaraugus, Chautauqua, Dutchess, Essex, Greene, Hamilton, Herkimer, Monroe, Oneida, Onondaga, Ontario, Orleans, Richmond, Saratoga, Suffolk, Tioga, Tompkins and Washington.

The number of species of which specimens have been added to the herbarium is 321. Of these, 72 were not previously represented in it and the remaining 249 are now better or more completely represented. Of the 72 species, 9 are considered new or previously undescribed species. These are all fungi. Descriptions of them will be given in the following pages. The names of the species of which specimens have been added to the herbarium are given under the title "Plants added to the herbarium."

The names of those who have contributed specimens and the names of the species represented by their respective contributions are given under the title "Contributors and their contributions." Many of the contributed specimens belong to extralimital species. Some of the specimens of mosses and hepatics contributed by Prof. John Macoun, botanist of the Geological and Natural History Survey of Canada, represent species found in the extreme western and northwestern part of British America. In some cases, specimens sent for identification have been in good condition and desirable for the herbarium. These have been preserved and credited to the sender as a contribution. The number of contributors is 54.

In a third chapter, under the heading "Species not before reported," are the names of species new to our flora. This contains the names of a few species that had previously been recorded and were represented in the herbarium as varieties of other species, but they have now been raised to specific rank and are herein recorded as good species. Remarks concerning habitats, descriptions of new species, and the time of collecting the specimens, are given under their respective species. The number of species recorded is 80. Of these 35 belong to the genus Crataegus.

In a fourth chapter, bearing the title "Remarks and observations," there is a record of new stations of rare plants, descriptions of new varieties, remarks concerning peculiar or distinguishing features of certain plants and new names given to some species as required by the law of priority.

The number of identifications of species made for correspondents and others, who have sent or brought specimens of plants to the office of the botanist for this purpose, is 675. The number of persons for whom identifications have been made is 100.

The number of species of mushrooms that have been tried and approved as edible is 8. Descriptions of these and of a new variety of a species previously found to be edible constitute a chapter entitled "Edible fungi." Colored figures of natural size have been prepared of all these and placed on 7 plates, octavo size. The number of New York species and varieties of edible mushrooms previously reported is 153.

Colored figures of 5 new species are given on 3 similar plates. The study of our Crataegus flora has been continued, and many specimens of trees and shrubs of this genus have been collected. The specific identity of many of these has not yet been determined. Rochester and its vicinity have furnished plants from which 31 species of Crataegus have been described by Prof. C. S. Sargent. Many of these were found within the limits of the city parks. By the wise and careful forethought of Mr C. C. Laney, superintendent of parks, labels have been placed on the particular thorn trees and shrubs which furnished the material from which the descriptions of the several new species were derived. Type trees, in a genus in which many species resemble each other as closely as they do in the genus Crataegus, possess a peculiar value and importance and it is very fortunate in this instance, where so many type trees and shrubs grow in such close proximity to each other and where they can be protected, that they have been properly labeled with their botanical names. It reduces very much any danger of mistakes in their identification.

In order to collect typical flowering specimens of as many of these species as possible, this prolific locality was visited in the flowering time of these plants and specimens were collected. It was again visited in autumn and a corresponding set of fruiting specimens was collected, so that now most of the Rochester species are well and, we believe, correctly represented in the state herbarium. These specimens will serve as a standard with which to compare specimens of closely related species collected in other localities. They exhibit the specific characters in some respects with greater precision than the words of descriptions can do.

It has been observed that there is some variability in the fruit of some species even on the same shrub. The fruit on a certain shrub of Crataegus delucida in 1903 was small, irregular and "wormy." The present year it was noticeably larger, fair and sound. The fruit of the Graves thorn, C. gravesii, which is produced by a clump of bushes near North Albany, is variegated when mature and ripening, dull red and green colors being intermingled. Three years in succession this clump has borne fruit of this character. Its failure to ripen its fruit evenly is due to the attacks of a parasitic fungus related to, if not the same species as, the one that causes apple scab on apples. A clump of bushes of the same species growing in Tivoli hollow bears fruit that is fair and uniformly colored when ripe. It appears to be exempt from the attacks of the fungus. The fruit on some plants has been more persistent this year than it was last year. This is perhaps largely due to the absence of many of the insects that usually prey on thorn apples. It is probably also due in part to favorable weather conditions. A plentiful supply of moisture has enabled the plants to maintain their growth and vigor late in the season. The more vigorous the plant the stronger its tendency to hold its foliage and fruit. In some species the fruit regularly persists long after the leaves have fallen.

The tendency of numerous species to crowd together in certain localities is a noticeable character in these plants. It is not uncommon to find two and three species growing close to each other and intermingling their branches so intimately as to appear at first sight to be a single intricately branched individual. If specimens for the herbarium are taken from such a clump great confusion and perplexity is likely to result unless the greatest care is taken not to mingle samples from different species. But association on a larger scale excites our wonder. That there should be 41 species of Crataegus growing spontaneously in the parks of the city of Rochester and in its immediate vicinity is a remarkable fact. On

Crown Point promontory, within an area of scarcely 50 acres, 13 species have been recognized, and in a certain locality within the limits of Albany on an area of scarcely 2 acres there are 15 species of Crataegus. Certain peculiarities of these groupings of species are not devoid of interest. In the Rochester locality the section Pruinosae is represented by 8 species, though C. pruinosa, the pruinose thorn itself is absent. The section Tenuifoliae is represented there by 11 species, but in the Crown Point locality this section has no representative and the section Pruinosae has but one and that is the pruinose thorn, the very one which is absent from Rochester. Only 5 species are common to the two localities, and these are species known to have a wide distribution. The two most abundant species at Crown Point are the cockspur thorn, C. crus-galli, and the round leaved thorn, C. coccinea rotundifolia. These two species apparently constitute fully one half of all the thorn growth of the locality. Several of the other species are represented by only a few individuals each. The dotted fruited thorn, C. punctata, is one of these scantily represented species. It is a species of wide range and probably occurs in more localities in our State than any other species. If any place has but one species of thorn it is most likely to be the dotted fruited thorn. If there are but two or three species this is likely to be the most abundant one. About Albany it and the cockspur thorn are common and nearly equal in abundance. Its slight representation in the Crown Point locality is therefore somewhat strange.

The botanical department contributed specimens of 16 species of edible mushrooms to the St Louis Exposition and, through the Forestry Commission, photographs and other representations of 80 species of trees.

Mr Stewart H. Burnham was employed as temporary assistant from July 1 to Sep. 21. He has made a rearrangement of the books and pamphlets of the library, and of the duplicate and extralimital specimens of the herbarium, has put typewritten labels on the shelves of the library and of the herbarium in order to facilitate reference to books and to specimens, and has prepared typewritten labels for a series of several hundred species of fungi that are kept in pasteboard boxes, placed these labels on the boxes and arranged them alphabetically. He has also assisted in the correspondence of the office and in disinfecting specimens. By his employment it was possible to keep the office open in the absence of the botanist while engaged in field work.

## PLANTS ADDED TO THE HERBARIUM

### *New to the herbarium*

Amanita crenulata *Pk.*
A. lignophila *Atk.*
A. radicata *Pk.*
Arenaria leptoclados *Guss.*
Arisaema stewardsoni *Britton*
Boletus atkinsoni *Pk.*
B. laricinus *Berk.*
B. nobilis *Pk.*
B. rugosiceps *Pk.*
Botrychium tenebrosum *A. A. Eaton*
Bryum pendulum *Schp.*
Clavaria botrytoides *Pk.*
C. xanthosperma *Pk.*
Collybia amabilipes *Pk.*
Convolvulus repens *L.*
Cortinarius heliotropicus *Pk.*
Crataegus acclivis *Sarg.*
C. baxteri *Sarg.*
C. beata *Sarg.*
C. beckwithae *Sarg.*
C. benigna *Sarg.*
C. colorata *Sarg.*
C. compta *Sarg.*
C. cupulifera *Sarg.*
C. deweyana *Sarg.*
C. diffusa *Sarg.*
C. dunbari *Sarg.*
C. durobrivensis *Sarg.*
C. ellwangeriana *Sarg.*
C. ferentaria *Sarg.*
C. formosa *Sarg.*
C. fulleriana *Sarg.*
C. gemmosa *Sarg.*
C. glaucophylla *Sarg.*
C. hudsonica *Sarg.*
C. laneyi *Sarg.*
Crataegus leiophylla *Sarg.*
C. lennoniana *Sarg.*
C. macauleyae *Sarg.*
C. maineana *Sarg.*
C. opulens *Sarg.*
C. ornata *Sarg.*
C. parviflora *Sarg.*
C. pedicellata *Sarg.*
C. persimilis *Sarg.*
C. rubicunda *Sarg.*
C. spissiflora *Sarg.*
C. streeterae *Sarg.*
C. tenuiloba *Sarg.*
C. verecunda *Sarg.*
Craterellus taxophilus *Thom*
Dipsacus laciniatus *L.*
Eocronartium typhuloides *Atk.*
Falcata pitcheri (*T. & G.*) *Kuntze*
Fusarium aquaeductuum *R. & R.*
Galera capillaripes *Pk.*
Gyrostachys ochroleuca *Rydb.*
Hypholoma rugocephalum *Atk.*
Hypomyces banningiae *Pk.*
H. inaequalis *Pk.*
Lachnocladium semivestitum *B. & C.*
Lactarius brevis *Pk.*
L. colorascens *Pk.*
Pholiota appendiculata *Pk.*
Salix serissima (*Bail.*) *Fern.*
Sisyrinchium arenicola *Bickn.*
Stachys sieboldi *Miq.*
Teucrium boreale *Bickn.*
Viola amoena *Le Conte*
V. latiuscula *Greene*
V. septentrionalis *Greene*
Zygodesmus granulosus *Pk.*

### *Not new to the herbarium*

Actaea rubra (*Ait.*) *Willd.*
Agaricus abruptibulbus *Pk.*
A. campester *L.*
A. subrufescens *Pk.*
Allium tricoccum *Ait.*
Alsine borealis (*Bigel.*) *Britton*
Amanita caesarea *Scop.*
A. muscaria *L.*
Amanitopsis volvata (*Pk.*) *Sacc.*
Amanitopsis vaginata (*Bull.*) *Roze*
Antennaria ambigens (*Greene*) *Fern.*
A. canadensis *Greene*
A. fallax *Greene*
A. neglecta *Greene*
A. petaloidea *Fern.*
A. plantaginea *R. Br.*
Anthemis cotula *L.*
Aquilegia vulgaris *L.*

Arenaria serpyllifolia *L.*
Arisaema triphyllum (*L.*) *Torr.*
Aristolochia clematitis *L.*
Artemisia stelleriana *Bess.*
Asplenium angustifolium *Mx.*
Asterodon ferruginosum *Pat.*
Bactridium ellisii *Berk.*
Bartonia virginica (*L.*) *B. S. P.*
Bidens frondosa *L.*
Blephariglottis ciliaris (*L.*) *Rydb.*
B. grandiflora (*Bigel.*)
Blephilia hirsuta (*Pursh*) *Torr.*
Blitum capitatum *L.*
Botrychium dissectum *Spreng.*
B. obliquum *Muhl.*
B. obliquum elongatum *G. & H.*
B. obliquum habereri *Gilb.*
B. obliquum oneidense *Clute*
B. simplex *Hitch.*
Boletinus grisellus *Pk.*
B. porosus (*Berk.*) *Pk.*
Boletus clintonianus *Pk.*
B. cyanescens *Bull.*
B. eximius *Pk.*
B. felleus *Bull.*
B. frostii *Russell*
B. illudens *Pk.*
B. nebulosus *Pk.*
B. rubropunctus *Pk.*
Bovista plumbea *Pers.*
Brassenia purpurea (*Mx.*) *Casp.*
Brassica arvensis (*L.*) *B. S. P.*
B. rapa *L.*
Callitriche heterophylla *Pursh*
Cantharellus cinnabarinus *Schw.*
C. floccosus *Schw.*
Carex castanea *Wahl.*
C. comosa *Boott*
C. crawei *Dew.*
C. formosa *Dew.*
C. hitchcockiana *Dew.*
C. lur. exundans *Bail.*
C. setifolia (*Dew.*) *Britton*
Cercospora circumscissa *Sacc.*
Chamaedaphne calyculata (*L.*)
Clavaria botrytes *Pers.*
C. cristata *Pers.*
C. platyclada *Pk.*
Claytonia caroliniana *Mx.*
Clitocybe albissima *Pk.*
C. candicans *Pers.*
C. centralis *Pk.*
C. clavipes *Pers.*
C. cyathiformis *Fr.*
C. eccentrica *Pk.*
C. ochropurpurea *Berk.*
Collybia nigrodisca *Pk.*
Convolvulus spithamaeus *L.*
Coprinus micaceus *L.*
Cornus canadensis *L.*
Cortinarius cinnamomeus *Fr.*
Crataegus holmesiana *Ashe*
C. macracantha *Lodd.*
C. pringlei *Sarg.*
C. tatnalliana *Sarg.*
C. succulenta *Lk.*
C. tomentosa *L.*
Cudonia circinans (*Pers.*) *Fr.*
C. lutea (*Pk.*) *Sacc.*
Cudoniella marcida (*Mull.*) *Sacc.*
Daedalea unicolor (*Bull.*) *Fr.*
Daphne mezereum *L.*
Dianthera americana *L.*
Diplodia conigena *Desm.*
Discina orbicularis *Pk.*
Eatonia pennsylvanica (*DC.*)
Eleocharis acicularis (*L.*) *R. & S.*
E. acuminata (*Mx.*) *Nees*
E. pal. vigens *Bail.*
E. pal. glaucescens (*Willd.*)
Eragrostis eragrostis (*L.*) *Karst.*
Eriophorum alpinum *L.*
Erythronium americanum *Ker*
Eurotium herbariorum (*Wigg.*) *Lk.*
Fagopyrum tataricum (*L.*) *Gaertn.*
Filix bulbifera (*L.*) *Underw.*
Fistulina hepatica *Fr.*
Fragaria americana (*Porter*) *Britton*
F. vesca *L.*
Fraxinus nigra *Marsh.*
Geoglossum ophioglossoides (*L.*)
G. velutipes *Pk.*
Geum canadense *Jacq.*
Gratiola aurea *Muhl.*
Gyalecta pineti (*Schrad.*) *Tuckm.*
Gyrostachys cernua (*L.*) *Kuntze*
G. stricta *Rydb.*
G. plantaginea (*Raf.*)

lla infula *Schaeff.*
ium praealtum *Vill.*
nia tomentosa *Nutt.*
um adustum *Schw.*
fennicum *Karst.*
imbricatum *L.*
vellereum *Pk.*
zonatum *Batsch*
ngea arborescens *L.*
phorus flavodiscus *Frost*
fuliginosus *Frost*
immutabilis *Pk.*
lau. decipiens *Pk.*
pratensis (*Pers.*) *Fr.*
oloma incertum *Pk.*
sublateritium *Schaeff.*
erticillata (*L.*) *Gray*
ersicolor *L.*
s acuminatus *Mx.*
balticus *Willd.*
brachycephalus (*Engelm.*)
marginatus *Rostk.*
erus nanus *Willd.*
rius alpinus *Pk.*
volemus *Fr.*
laricinus (*DuRoy*) *Koch*
rus myrtifolius *Muhl.*
nus lepideus *Fr.*
suavissimus *Fr.*
tes sepiaria *Fr.*
ta cepaestipes *Sow.*
glossum luteum (*Pk.*) *Sacc.*
rchis loeselii (*L.*) *MacB.*
n superbum *L.*
rchis dil. linearifolia *Rydb.*
spermum officinale *L.*
ia cardinalis *L.*
is alba *Mill.*
chalcedonica *L.*
m vulgare (*Ait.*) *Dunal*
coronaria (*L.*) *Mill.*
mius res. candidissimus *Pk.*
oreades *Fr.*
a canadensis *L.*
ia scandens *Willd.*
ella bispora *Sor.*
deliciosa *Fr.*
phyllum verticillatum *L.*
flexilis (*Willd.*) *R. & S.*
bergia thyrsiflora (*L.*)

Omphalia austinii *Pk.*
Onagra oakesiana (*Gr.*) *Britton*
Osmunda claytoniana *L.*
Oxalis corniculata *L.*
O. cymosa *Small*
Panax quinquefolium *L.*
Panicum lanuginosum *Ell.*
Peramium pubescens (*Willd.*)
Phacelia dubia (*L.*) *Small*
Phlox subulata *L.*
Pholiota adiposa *Fr.*
P. togularis (*Bull.*) *Fr.*
Phytophthora infestans (*Mont.*)
Picea canadensis (*Mill.*)
P. mariana (*Mill.*) *B. S. P.*
Pleurotus ostreatus (*Jacq.*) *Fr.*
P. ulmarius *Fr.*
Pluteus cervinus (*Schaeff.*) *Fr.*
Polygonum lapathifolium *L.*
Polystictus pergamenus *Fr.*
P. pseudopergamenus *Thum.*
Potamogeton natans *L.*
Potentilla argentea *L.*
Protomyces erythronii *Pk.*
Prunus americana *Marsh.*
P. cuneata *Raf.*
P. nigra *Ait.*
P. pennsylvanica *L.*
Pterospora andromedea *Nutt.*
Quercus acuminata (*Mx.*)
Q. nana (*Marsh.*) *Sarg.*
Q. prinos *L.*
Ranunculus hispidus *Mx.*
Rhamnus cathartica *L.*
Rosa sayi *Schw.*
R. setigera *Mx.*
Rubus canadensis *L.*
R. nigrobaccus *Bail.*
R. odoratus *L.*
Rudbeckia hirta *L.*
R. laciniata *L.*
Rumex acetosa *L.*
Russula compacta *Frost*
R. earlei *Pk.*
R. flavida *Frost*
R. lepida *Fr.*
R. magnifica *Pk.*
R. mariae *Pk.*
R. virescens (*Schaeff.*)

Rynchospora alba (*L.*) *Vahl*
Salix amygdaloides *Anders.*
S. pet. gracilis *Anders.*
Sarracenia purpurea *L.*
Scirpus occidentalis (*Wats.*)
S. pedicellatus *Fern.*
Scrophularia marylandica *L.*
Selaginella apus *Spring*
Silene antirrhina *L.*
S. vulgaris (*Moench*)
Sisymbrium altissimum *L.*
Sisyrinchium angustifolium *Mill.*
Smilax hispida *Muhl.*
Solidago uniligulata (*D C.*) *Porter*
Specularia perfoliata (*L.*) *D C.*
Stachys aspera *Mx.*
S. palustris *L.*
Stereum complicatum *Fr.*
S. spadiceum *Fr.*
Scleroderma vulgare *Hornem.*
Teucrium boreale *Britton*
Thymus serpyllum *L.*
Tricholoma personatum *Fr.*
Urnula craterium (*Schw.*) *Fr.*
Vagnera stellata (*L.*) *Morong*
Veronica byzantina (*S. & S.*)
Viburnum dentatum *L.*
V. lentago *L.*
V. opulus *L.*
Viola blanda *Willd.*
V. palm. dilatata *Ell.*
V. pap. domestica (*Bickn.*)
V. pubescens *Ait.*
V. rotundifolia *Mx.*
V. scabriuscula (*T. & G.*) *Schw.*
V. sororia *Willd.*
Xyris montana *Ries*
Zygadenus elegans *Pursh*

## CONTRIBUTORS AND THEIR CONTRIBUTIONS

**Mrs E. B. Blackford,** Boston Mass
Amanita radicata *Pk.*

**Mrs F. B. M. Cholwell,** Old Forge
Amanita phalloides *Fr.*

**Miss J. F. Conant,** Melrose Mass
Hygrophorus pallidus *Pk.*

**Mrs G. M. Dallas,** Philadelphia Pa.
Eryngium virginianum *Lam.*
Geopyxis nebulosa (*Cke.*) *Sacc.*

**Mrs C. F. Davis,** Falmouth Me.
Clitocybe clavipes (*Pers.*) *Fr.*

**Mrs M. S. De Coster,** Little Falls
Daphne mezereum *L.*

**Miss H. A. Edwards,** Port Henry
Pterospora andromedea *Nutt.*

**Miss R. C. Fish,** Norwich Ct.
Clitopilus tarduus *Pk.*

**Mrs L. L. Goodrich,** Syracuse
Phacelia dubia (*L.*) *Small*

**Miss C. C. Haynes**, Highlands N. J.

Bazzania triloba (*L.*) *S. F. Gray*
Blepharostoma trichophyllum (*L.*) *Dumort.*
Cephalozia curvifolia (*Dicks.*) *Dumort.*
C. lunulaefolia *Dumort.*
Cololejeunea biddlecomiae (*Aust.*) *Evans*
Conocephalum conicum *Dumort.*
Frullania asagrayana *Mort.*
F. eboracensis *Gottsche*
Jamesoniella autumnalis (*D C.*) *Steph.*
Lepidozia reptans (*L.*) *Dumort.*
Lophozia barbata (*Schreb.*)
L. incisa (*Schrad.*)
Plagiochila asplenioides (*L.*) *Dumort.*
Porella platyphylla (*L.*) *Lindb.*
Ptilidium ciliare (*L.*) *Nees*
Radula complanata (*L.*) *Dumort.*
Scapania nemorosa (*L.*) *Dumort.*
S. undulata (*L.*) *Dumort.*
Sphenobolus exsectus (*Schm.*)
Trichocolea tomentella (*Ehrh.*)

**Mrs M. A. Knickerbocker**, San Francisco Cal.

Berberis pinnata *Lag.*
Chrysoma ericoides (*Less.*) *Greene*
Croton californicus *Muell.*
Garrya elliptica *Doug.*
Heteromeles arbutifolia *Roem.*
Pseudotsuga mucronata (*Raf.*)
Rhus integrifolia *B. & H.*
Ribes sanguineum *Pursh*
Sequoia sempervirens *Endl.*
Vaccinium ovatum *Pursh*

**Miss J. A. Moses**, Jamestown

Viola rotundifolia *Mx.*

**Miss C. S. Parsons**, Albany

Rudbeckia hirta *L.*

**Mrs J. M. Peters**, Pleasant Valley

Hypholoma sublateritium (*Schaeff.*) *Fr.*

**Miss T. L. Smith**, Worcester Mass.

Cantharellus brevipes *Pk.*
Clitocybe decora *Fr.*
Hexagona micropora *Murrill*
Hydnum adustum *Schw.*
H. vellereum *Pk.*
Hypocrea pallida *E. & E.*
Lepiota amianthina *Scop.*
Pleurotus porrigens (*Pers.*) *Fr.*
Polyporus pubescens *Schum.*
P. varius *Fr.*

**Miss M. S. Whetstone**, Minneapolis Minn.

Pluteus umbrosus *Pers.*

**J. C. Arthur**, Lafayette Ind.

Puccinia brickelliae *Pk.*
P. malvacearum *Mont.*
Puccinia simillima *Arth.*
P. viguierae *Pk.*

**G. F. Atkinson**, Ithaca

Amanita caesarea *Scop.*
A. lignophila *Atk.*
A. mappa *Fr.*
Clitocybe asperulospora *Atk.*
Collybia amabilipes *Pk.*
Coprinus ebulbosus *Pk.*
Eocronartium typhuloides *Atk.*
Hydnum imbricatum *L.*
Hypholoma rugocephalum *Atk.*
Lachnocladium semivestitum *B.&C.*
Lactarius colorascens *Pk.*
Pholiota adiposa *Fr.*
Russula sordida *Pk.*
Tricholoma sulphureum (*Bull.*)
Uredinopsis atkinsonii *Magn.*
U. osmundae *Magn.*

**A. M. Baker,** Irondequoit

Geaster triplex *Jungh.*

**H. J. Banker,** California Pa.

Physalacria inflata (*Schw.*) *Pk.*
Scorias spongiosa (*Schw.*) *Fr.*

**E. Bartholomew,** Rockport Kan.

Uromyces gaurinus (*Pk.*) *Long*
Uromyces oenotherae *Burrill*

**F. S. Boughton,** Pittsford

Hyphomyces banningiae *Pk.*

**F. J. Braendle,** Washington D. C.

Cortinarius braendlei *Pk.*
Phallus imperialis *Schulz.*
Thelephora palmata *Scop.*
Torrubia militaris (*L.*) *Lk.*

**E. Brainerd,** Middlebury Vt.

Viola cucullata *Ait.*
V. latiuscula *Greene*
V. obliqua *Hill*
Viola palmata dilatata *Ell.*
V. septentrionalis *Greene*
V. sororia *Willd.*

**S. H. Burnham,** Vaughns

Aronia atropurpurea *Britton*
Aster lat. thyrsoidea (*Gr.*) *Sheldon*
Bidens frondosa *L.*
Favolus europaeus *Fr.*
Gyrostachya ochroleuca *Rydb.*
Hebeloma illicitum *Pk.*
Hieracium marianum *Willd.*
Hypomyces lactifluorum *Schw.*
Monarda punctata *L.*
Nabalus altissimus (*L.*) *Hook.*
Polyporus elegans *Fr.*
P. pallidus *S. & K.*
Rhus glab. borealis *Britton*
Rosa sayi *Schw.*
Salix pet. gracilis *Anders.*
Sisyrinchium arenicola *Bickn.*
Stachys sieboldi *Miq.*
Steironema lanceolatum (*Walt.*)
Thymus serpyllum *L.*
Trametes rubescens *Fr.*
Tremella fuciformis *Berk.*
Tricholoma personatum *Fr.*
Urnula craterium (*Schw.*) *Fr.*
Vicia angustifolia *Roth*

**G. D. Cornell,** Cooper's Plains

Panax quinquefolium *L.*

**S. Davis,** Boston Mass.

Agaricus comtulus *Fr.*
Clitocybe brumalis *Fr.*
Hypholoma incertum *Pk.*
Pholiota togularis (*Bull.*) *Fr.*
Tricholoma pallidum *Pk.*
T. terr. fragrans *Pk.*

**F. Dobbin,** Shushan

Convolvulus repens *L.*
C. spithamaeus *L.*
Stemonitis fusca *Roth*

**C. E. Fairman**, Lyndonville

Armillaria nardosmia *Ellis*
Clitocybe eccentrica *Pk.*
Hydnum spongiosipes *Pk.*
Russula crustosa *Pk.*

**F. E. Fenno,** Nichols

Crataegus tomentosa *L.*
Juncus acuminatus *Mx.*
J. balticus *Willd.*
J. brachycephalus (*Engelm.*)
J. marginatus *Rostk.*
Lobelia kalmii *L.*
Panicum xanthophysum *Gray*
Parnassia caroliniana *Mx.*
Polygala viridescens *L.*
Polygonum lapathifolium *L.*
Roripa sylvestris (*L.*) *Bess.*
Rosa setigera *Mx.*
Rynchospora alba (*L.*) *Vahl.*
R. capillacea *Torr.*
Scirpus pedicellatus *Fern.*
Silene vulgaris (*Moench*) *Garcke*
Smilax hispida *Muhl.*
Solidago uniligulata (*D C.*)*Porter*

**G. B. Fessenden,** Boston Mass.

Lactarius regalis *Pk.*

**B. D. Gilbert,** Clayville

Bryum pendulum *Schp.*
Camptothecium nitens *Schp.*

**N. M. Glatfelter,** St Louis Mo.

Gyromitra brunnea *Underw.*
Panus meruliiceps *Pk.*

**C. C. Hanmer,** East Hartford Ct.

Guepinia spathularia *Schw.*

**J. V. Haberer,** Utica

Achroanthes monophylla (*L.*) *Greene*
A. unifolia (*Mx.*) *Raf.*
Adopogon carolinianum *Britton*
Alsine borealis (*Bigel.*) *Britton*
Arenaria leptoclados *Guss.*
A. serpyllifolia *L.*
Antennaria canadensis *Greene*
A. fallax *Greene*
A. neglecta *Greene*
A. parlinii *Fern.*
A. petaloides *Fern.*
A. plantaginea *B. Br.*
Artemisia stelleriana *Bess.*
Asclepias tuberosa *L.*
Bartonia virginica (*L.*) *B. S. P.*
Blephariglottis grandiflora (*Bigel.*)
Botrychium dissectum *Spreng.*
B. obliquum *Muhl.*
B. obliquum elongatum *G. & H.*
B. obliquum habereri *Gilb.*
B. obliquum oneidense *Clute*
B. simplex *Hitch.*
B. tenebrosum *Eaton*
Callitriche heterophylla *Pursh*
Ceanothus americanus *L.*
Fragaria vesca *L.*
Galium mollugo *L.*
Geranium bicknellii *Britton*
Gyrostachys cernua (*L.*)
G. ochroleuca *Rydb.*
G. plantaginea (*Raf.*)
G. praecox (*Walt.*) *Kuntze*
G. stricta *Rydb.*
Lactuca virosa *L.*
Leptorchis loeselii (*L.*) *MacM.*
Limnorchis dil. linearifolia *Rydb.*
Lycopodium tristachyum *Pursh*
Lysimachia terrestris (*L.*) *B. S. P.*
Myriophyllum verticillatum *L.*
Naias flexilis (*Willd.*) *R. & S.*
Oxalis corniculata *L.*
Peramium pubescens (*Willd.*)
Polygonella articulata (*L.*)
Rhamnus cathartica *L.*
Rumex acetosa *L.*
Scrophularia marylandica *L.*
Selaginella apus *Spring*
Silene antirrhina *L.*
Sorbus aucuparia *L.*
Specularia perfoliata (*L.*) *D C.*
Stachys palustris *L.*
S. aspera *Mx.*
Teucrium boreale *Bickn.*
Valeriana uliginosa *Rydb.*
Verbascum lychnidis *L.*
Xyris montana *Ries*

**W. Herriot,** Galt Ont.

Carex lupuliformis *Sart.*
Leontodon hispidus *L.*
Linaria minor *Desf.*

**H. H. Hindshaw,** Albany

Anthoceros laevis *L.*
Bulgaria inquinans *Fr.*

**E. A. Lehman,** Winston-Salem N. C.

Merulius lacrymans (*Jacq.*) *Fr.*

**R. B. Mackintosh,** Peabody Mass.

Boletus parasiticus *Bull.*
B. rubropunctus *Pk.*
Hydnum fennicum *Karst.*
Hydnum vellereum *Pk.*
Lepiota rhacodes (*Vitt.*) *Fr.*

**J. Macoun,** Ottawa Can.

Amblystegium fluviatile *B. & S.*
A. subcompactum *C. M. & K.*
Andraea petrophila *Ehrh.*
Aneura latifrons *Lindb.*
A. pinguis *Dumort.*
Anthoceros laevis *L.*
Aulacomnion palustre (*L.*) *Schwaegr.*
A. palustre imbricatum *B. & S.*
A. palustre subimbricatum *Kindb.*
A. turgidum (*Wahl.*)
Barbula circinnatula *C. M. & K.*
B. convoluta *Hedw.*
Bazzania trilobata (*L.*) *S. F. Gray*
Biatora uliginosa (*Schrad.*) *Fr.*
Blepharostoma setiforme (*Ehrh.*)
B. trichophyllum (*L.*)
Brachythecium glareosum *Bruch*
B. salebrosum *B. & S.*
Bryum arcticum *B. & S.*
B. auromontanum *Kindb.*
B. caespiticium *L.*
B. capillare *L.*
B. cirrhatum *H. & H.*
B. cyclophyllum *B. & S.*
B. dawsoniense *Will.*
B. duvalii *Voit*
B. ery. gaspeanum *Kindb.*
B. haematophyllum *Kindb.*
B. intermedium *Brid*
B. klondikense *Kindb.*
B. micans *Limpr.*
B. mucronigerum *Philib.*
Bryum pseudotriquetrum *Schwaegr.*
Calliergon cordifolium *Hedw.*
C. giganteum *Schp.*
C. stramineum *Dicks.*
C. subgiganteum *Kindb.*
Camptothecium nitens *Schreb.*
C. nitens microthecium *Kindb.*
Campylium stellatum *Schreb.*
Catascopium nigritum *Brid.*
Cephalozia bicuspidata (*L.*)
C. leucantha *Spruce*
C. media *Lindb.*
C. pleniceps (*Aust.*)
Ceratodon columbiae *Kindb.*
Chiloscyphus polyanthos *Cd.*
Climacium dendroides *W. & M.*
Corticium canadense *Burt*
C. calc. glebulosum *Fr.*
C. croceum (*Kunze*)
C. crustaceum *Karst.*
C. effuscatum *C. & E.*
C. galactinum (*Fr.*) *Burt*
C. greschikii *Bres.*
C. pinicolum *Tul.*
Cynodontium strumiferum *Ehrh.*
C. torquescens (*Bruch*)
C. wahlenbergii (*Brid.*)
Dicranella crispa *Schp.*
D. secunda (*Sw.*) *Lindb.*
Dicranum bergeri *Bland.*
D. bergeri brevifolium *Lindb.*
D. bergeri rupincola *Kindb.*
D. elongatum *Schwaegr.*

Dicranum elongatum attenuatum *Kindb.*
D. elongatum subfragilifolium *K.*
D. fragilifolium *Lindb.*
D. fuscescens *Turn.*
D. leioneuron *Kindb.*
D. muehlenbeckii *B. & S.*
D. schisti *Lindb.*
D. spadiceum *Zett*
D. sphagni *Wahl.*
D. subpalustre *C. M. & K.*
D. sulcatum *Kindb.*
Didymodon baden-powelli *Kindb.*
Diplophylleia albicans (*L.*) *Trev.*
D. taxifolia (*Wahl.*) *Trev.*
Distichum capillaceum *B. & S.*
Ditrichum flex. densum *Kindb.*
D. inclinatum *Ehrh.*
D. macouni *C. M. & K.*
D. pallidum *Hampe*
Eurhynchium edentulum *Kindb.*
E. strigosum (*Hoffm.*)
E. strigosum praecox *Hedw.*
E. strigosum robustum *Kindb.*
Fissidens grandifrons *Brid.*
F. osmundoides (*Sw.*)
Fontinalis hypnoides *Hartm.*
F. novae-angliae *Sulliv.*
F. squamosa *L.*
Fossombronia foveolata *Lindb.*
Frullania eboracensis *Gotts.*
Grandinia papillata *B. & C.*
Gymnomitrium coralloides *Nees*
Hymenochaete corrugata *Fr.*
Hypnum aduncum *L.*
H. amblyphyllum *Will.*
H. cupressiforme *L.*
H. exannulatum *Guemb.*
H. fluitans *L.*
H. kneiffia *B. & S.*
H. molluscoides *Kindb.*
H. plumiferum *Mitt.*
H. revolvens *Swartz*
H. rugosum *L.*
H. schreberi *Willd.*
H. subimponens *Lesq.*
H. uncinatum *Hedw.*
Isothecium myosuroides (*L.*) *Brid.*
Kantia trichomanes (*L.*) *S. F. Gray*
Lecanora elatina *Ach.*
L. elatina ochrophaea *Tuckm.*
L. pallescens (*L.*) *Schaer.*
Leptobryum pyriforme (*L.*) *Schp.*
Lophocolea foveolata *Lindb.*
L. minor *Nees*
Lophozia barbata (*Schreb.*)
L. floerkii (*W. & M.*)
L. inflata (*Huds.*)
L. kunzeana *Hueben.*
L. lyoni *Tayl.*
L. minuta *Crantz*
L. rutheana *Limpr.*
L. saxicola (*Schrad.*)
L. ventricosa (*Dicks.*)
Meesia albertini *B. & S.*
M. trichodes (*L.*) *Spruce*
M. uliginosa *Hedw.*
Merulius bellus *B. & C.*
Mnium blyttii *B. & S.*
M. hymenophyllum *Bry. Eur.*
M. macouni *Kindb.*
M. macrophyllum *Kindb.*
M. medium *B. & S.*
M. pseudolycopodioides *C. M. & K.*
M. rugicum *Laur.*
M. subglobosum *B. & S.*
Myurella apiculata *B. & S.*
M. julacea *B. & S.*
Odontoschisma macouni *Aust.*
Orthotrichum anomalum *Hedw.*
O. porteri *Aust.*
O. schimperi *Hamm.*
Pallavicinia lyellii (*Hook.*)
Paludella squarrosa (*L.*) *Brid.*
Peniophora cinerea (*Fr.*)
Phascum cuspidatum *Schreb.*
Philonotis aciculare-pungens *C. M. & K.*
P. alpicola *Jurat.*
P. font. microthamniae *Kindb.*
P. trichophorum (*Spruce*)
Polytrichum hyperboreum *R. Br.*
P. juniperinum *Willd.*
P. juniperinum alpinum *Kindb.*
P. piliferum *Schreb.*

Polytrichum strictum *Banks*
Porella pinnata *L.*
Pseudoleskea malacoclada *C. M. & K.*
Psilopilum glabratum *Lindb.*
Ptilidium ciliare (*L.*) *Nees*
Saxicola lophozioides *Evans*
Scouleria muelleri *Kindb.*
Sebacina calcea (*Pers.*) *Bres.*
Sphagnum acutifolium *R. & W.*
Sphagnum girgensohni *Russ.*
S. medium *Limpr.*
Stereum sulcatum *Burt*
S. tuberculosum *Fr.*
Thuidium abietinum *B. & S.*
Thuidium philiberti *Limpr.*
Webera albicans *Schp.*
W. annotinum *Schwaegr.*
W. cruda *Schp.*
W. nutans *Hedw.*

**C. McIlvaine,** Cambridge Md.

Lentinus vulpinus *Fr.*
Simblum rubescens *Ger.*

**F. H. Mickleborough,** Brooklyn

Hypomyces inaequalis *Pk.*

**G. E. Morris,** Waltham Mass.

Agaricus micromegethus *Pk.*
Boletinus grisellus *Pk.*
Cortinarius morrisii *Pk.*
Hydnum adustum *Schw.*

**C. H. Prescott,** Albany

Boletus clintonianus *Pk.*
Boletus laricinus *Berk.*

**C. S. Sargent,** Jamaica Plain Mass.

Crataegus acclivis *Sarg.*
C. baxteri *Sarg.*
C. beata *Sarg.*
C. benigna *Sarg.*
C. colorata *Sarg.*
C. compta *Sarg.*
C. conjuncta *Sarg.*
C. cupulifera *Sarg.*
C. deweyana *Sarg.*
C. diffusa *Sarg.*
C. dunbari *Sarg.*
C. durobrivensis *Sarg.*
C. ellwangeriana *Sarg.*
C. ferentaria *Sarg.*
C. forbesiae *Sarg.*
C. formosa *Sarg.*
C. fucosa *Sarg.*
C. gemmosa *Sarg.*
C. glaucophylla *Sarg.*
C. laneyi *Sarg.*
Crataegus leiophylla *Sarg.*
C. lennoniana *Sarg.*
C. holmesiana *Ashe*
C. macauleyae *Sarg.*
C. maineana *Sarg.*
C. matura *Sarg.*
C. ornata *Sarg.*
C. opulens *Sarg.*
C. parviflora *Sarg.*
C. pastorum *Sarg.*
C. pedicellata *Sarg*
C. persimilis *Sarg.*
C. pringlei *Sarg.*
C. rubicunda *Sarg.*
C. spissiflora *Sarg.*
C. streeterae *Sarg.*
C. succulenta *Lk.*
C. tenuiloba *Sarg.*
C. thayeri *Sarg.*
C. verecunda *Sarg.*

**E. B. Sterling,** Trenton N. J.

Cyclomyces greenei *Berk.*
Lactarius corrugis *Pk.*

**F. C. Stewart,** Geneva

Coleosporium senecionis (*Pers.*) *Fr.*
Fusarium aquaeductuum *R. & R.*

**D. R. Sumstine,** Kittanning Pa.

Grifola sumstinei *Murrill*
Hydnum earleanum *Sumst.*
Pholiota luteofolia *Pk.*
Pleurotus umbonatus *Pk.*

**C. Thom,** Storrs Ct.

Craterellus taxophilus *Thom*

**C. Thal,** Milwaukee Wis.

Cortinarius heliotropicus *Pk.*

**H. L. Ward,** Milwaukee Wis.

Lepiota acutesquamosa *Weinm.*

**J. E. Weaver,** Rochester

Lentinus lepideus *Fr.*

**D. O. Wickham,** Hotel Champlain

Clavaria pistillaris *L.*
Clitocybe multiceps *Pk.*
Geaster minimus *Schw.*

**D. B. Young,** Albany

Morchella deliciosa *Fr.*

## SPECIES NOT BEFORE REPORTED

### **Amanita crenulata** Pk.

Among fallen leaves in woods. Port Jefferson. August. In our specimens the pileus is more yellow and its margin more distinctly striate than in the type specimens. The mealiness at the top of the stem and the flocculent edge of the lamellae in some of the specimens are also yellowish.

### **Amanita lignophila** Atk. ined.

Decaying wood in woods beyond Forest Home near Ithaca. G F Atkinson. A rare species similar in size and shape to Amanita mappa but separable from it by the grayish brown color of the pileus, the solid stem and the thicker membrane of its volva. The spores are globose, granular within and .0003–.0004 of an inch in diameter.

### **Amanita radicata** Pk.

Sandy soil in woods and open places. Port Jefferson, Suffolk co. August. In our specimens the warts of the pileus are smaller than in the typical form.

### **Arenaria leptoclados** Guss.

Wet rocky places near Little Falls. October. J. V. Haberer. This is A. serpyllifolia var. tenuior Koch of *Synoptical Flora of North America*, fasc. 2 p. 239. Introduced.

### **Arisaema stewardsoni** Britton

Moist rich soil in woods. Lake Bonaparte. June. Similar to A. triphyllum in size and general appearance, but easily separated from it by the white spadix and spathe. Forms having a pale but striped spathe sometimes occur and appear to be intermediate between the two species.

### **Boletus atkinsoni** n. sp.

PLATE R, FIG. 1-5

Pileus fleshy, convex or nearly plane, dry, grayish brown or yellowish brown, sometimes minutely rimosely squamulose, flesh white, taste mild; tubes convex, plane or slightly concave in the mass, adnate or slightly depressed around the stem, 3-4 lines long, the mouths minute, at first whitish and stuffed, soon open and yellow or subochraceous; stem stout, equal or slightly thickened at one or both ends, solid, reticulated wholly or at the top only with fine anastomosing brownish lines, pallid; spores fusiform or oblong, .0004-.0005 of an inch long, .00016–.0002 broad.

Pileus 3-4 inches broad; stem 2-4 inches long, 6-12 lines thick.

Woods. Port Jefferson. August. The species belongs to the section Edules. The reticulations of the stem are so delicate that they sometimes nearly disappear in drying.

### **Boletus laricinus** Berk.

Under larch trees, Larix decidua Mill. Washington park, Albany. October. C. H. Prescott. Edible.

### **Boletus nobilis** n. sp.

Woods. Port Jefferson. August. Edible. For description of the species see article on edible fungi.

### **Boletus rugosiceps** n. sp.

PLATE Q, FIG. 6-10

Pileus firm, fleshy, very convex or hemispheric, becoming broadly convex, dry, rugosely pitted, ochraceous, sometimes tinged with red or orange, occasionally rimose areolate, the thin margin often extending slightly beyond the tubes, flesh white or whitish; tubes at first closed, depressed around the stem, their mouths yellow, becoming darker with age, minute, round; stem firm, subequal, solid, with elevated longitudinal lines or ridges, dotted with numerous brownish or yellowish points, pallid, often narrowed at the base; spores oblong fusiform, .0006-.0008 of an inch long, .0002-.00024 broad.

Pileus 1-3 inches broad; stem 3-4 inches long, 6-8 lines thick.

Woods. Port Jefferson. August. This species grows with B. rubropunctus, from which it is easily separated by its dry pileus, smaller tubes and stouter stem. This is large in proproportion to the size of the pileus. In both the scabrously dotted stem is suggestive of Boletus scaber, but both are separable from that species by the yellow color of the tubes and the different dots of the stem.

### **Botrychium tenebrosum** A. A. Eaton

Deerfield, Oneida co. July. J. V. Haberer. This is one of the smallest of the grape ferns.

### **Bryum pendulum** Schp.

Clayville, Oneida co. B. D. Gilbert.

### **Cladonia verticillata** Hoffm.

Adirondack mountains. Formerly considered a variety of C. gracilis, but now deemed worthy of specific distinction.

### **Clavaria botrytoides** n. sp.

Ground in woods. Port Jefferson. August. Edible. For description of the species see the article on edible fungi.

### **Clavaria xanthosperma** n. sp.

Stem very short, firm, solid, divided into numerous branches, white, sometimes becoming red where wounded, ultimate branches short, blunt or obtusely dentate at the apex, the axils rounded, the whole plant white, becoming yellowish or cream-colored with age; spores pale yellow, oblong, .0005-.0006 of an inch long, .00016-.0002 broad, slightly and obliquely pointed at one end.

Woods. Smithtown, Suffolk co. August.

It forms tufts about 2 inches high.

### **Collybia amabilipes** Pk.

Dead trunks. Near Ithaca. June. G. F. Atkinson. Readily distinguished by its tawny, velvety stem.

### **Convolvulus repens** L.

Shushan, Washington co. August. F. Dobbin. This species may be distinguished from C. spithamaeus by its long trailing or twining stems and by the rounded basal lobes of its leaves.

### **Cortinarius heliotropicus** n. sp.

PLATE P, FIG. 1-7

Pileus thin, broadly campanulate, convex or nearly plane, fibrillose, viscid, heliotrope purple, generally spotted or variegated by yellowish white spots, flesh whitish, taste mild or slightly and tardily acrid, odor slight, resembling that of radishes; lamellae narrow, thin, close, rounded behind, adnexed, concolorous with the pileus when young, cinnamon when mature; stem firm, solid, or spongy within, usually slightly thickened at the base, silky fibrillose, viscid, whitish, spotted with purple or colored like the pileus, white within, spores elliptic, .0004-.0005 of an inch long, .0002-.00024 broad.

Pileus 1-2.5 inches broad; stem 1.5-3 inches long, 2-4 lines thick.

Woods. Smithtown. August. This is one of the most beautiful species of Cortinarius. It belongs to the section Myxacium.

In some specimens the spots on the pileus are large or confluent, in others they are almost or entirely absent, but usually they are small and distinct. The purple color of the lamellae is persistent for some time. In large specimens the margin is sometimes adorned by fibrillose scales of the veil.

### **Craterellus taxophilus** Thom

Decaying vegetable matter under branches of ground hemlock, Taxus canadensis. Ithaca. October. C. Thom.

### **Crataegus persimilis** Sarg.

Near Eastern avenue continued, Rochester. This species is allied to C. crus-galli from which it may be separated by its smaller flowers, more numerous stamens, more highly colored fruit and more conspicuously glandular serrate calyx lobes.

### **Crataegus beata** Sarg.

Near the roundhouse of the Pennsylvania Railroad, Rochester. Also reported from several other places in and near Rochester. The 20 stamens with dark maroon colored anthers constitute a peculiar character of this species. It and the seven following species belong to the section Pruinosae. In all of them the fully grown but unripe fruit is more or less pruinose.

### **Crataegus lennoniana** Sarg.

Seneca park, Rochester. Reported from Adams Basin, Monroe co., and Murray, Orleans co., by M. S. Baxter and from Buffalo by

J. Dunbar. In this and the preceding species the flowers have 20 stamens with red anthers and the fruit is longer than broad.

**Crataegus leiophylla** Sarg.

Seneca park, Rochester. This thorn takes its specific name from the smoothness of its leaves. Its flowers have 20 stamens but the anthers are pale yellow. Its fruit remains green and pruinose late in the season, ripening in November.

**Crataegus formosa** Sarg.

Seneca park, Rochester. It has been reported from Buffalo by Mr Dunbar. Its stamens are 20 and the anthers pale yellow. Its fruit also is longer than broad. The tips of the calyx lobes are often deciduous from the ripe fruit.

**Crataegus compta** Sarg.

Seneca park and Genesee Valley park, Rochester. It has also been found at Rush, Monroe co. and Avon, Livingston co. by Mr Baxter and at Buffalo by Mr Dunbar. Its stamens are 10 and the fruit is generally longer than broad, and is often somewhat pointed at the base. It is peculiar in having a bitter taste. The mature leaves are dark bluish green on the upper surface.

**Crataegus diffusa** Sarg.

Seneca park, Rochester. Niagara Falls. C. S. Sargent. A shrub with numerous stems and widespreading branches. Its 10 stamens with purple anthers constitute one of its peculiar features. On vigorous young shoots the leaves are sometimes as broad as they are long and they have petioles shorter than those of the leaves on lateral or fertile branches. The fruit is similar in size and shape to that of C. compta.

**Crataegus opulens** Sarg.

Eastern bank of the Genesee river in the northern part of Rochester. The opulent thorn is a rare but well marked species. In the leaves of young and vigorous shoots the basal pair of lobes is enlarged and distinctly separated from the pair above by deep clefts in the margins of the leaf. This gives a three lobed appearance to the leaf. Sometimes the basal lobes are themselves slightly lobed. The fruit is either globose or depressed globose.

**Crataegus maineana** Sarg.

West side of Seneca park, Rochester. Near Portage, Livingston co. Also found at Adams Basin by Mr Baxter and at Buffalo by

Mr Dunbar. The late ripening globose fruit and the bronze red autumnal foliage are noticeable characters of this species. It has 10 stamens with purple anthers as in C. diffusa, but in its almost deltoid or triangular leaves and its nearly entire calyx lobes it is quite distinct from it.

### **Crataegus baxteri** Sarg.

Seneca park, Rochester. It has also been found at Honeoye lake by Mr Baxter and at Chapinville, Ontario co. by Professor Sargent. It and the next following species belong to the section Intricatae.

### **Crataegus verecunda** Sarg.

Seneca park, Rochester. This is at present the only known locality of this very rare thorn. It is a smaller shrub than the Baxter thorn and its smaller fruit is longer than broad. The fruit of C. baxteri is nearly or quite globose and ripens later.

### **Crataegus fulleriana** Sarg.

In the northern part of Rochester on the east bank of Genesee river. It has been found at Rush and Rochester Junction, Monroe co., by Messrs Baxter and Dunbar. This and the two following species belong to the section Molles. The Fuller thorn is a fine and an attractive species. Its flowers have 20 stamens and its large scarlet hairy but shining fruit is longer than broad. It may be either rounded or pointed at the base and is crowned by the long, very narrow and persistent calyx lobes which constitute a peculiar feature of the species.

### **Crataegus ellwangeriana** Sarg.

Rochester and near Portage, Livingston co. The Ellwanger thorn becomes a tree of considerable size. It differs from the Fuller thorn in having only 8-10 stamens in its flowers, in its shorter, stouter spines, shorter pedicels and broader calyx lobes.

### **Crataegus spissiflora** Sarg.

Genesee Valley park, Rochester. Between North Albany and Menands, east of Troy road. The peculiar character of this species and one suggestive of the specific name is its small compact clusters of flowers. Much of the hairiness of its inflorescence and early foliage disappears with age. Its fruit is generally a little longer than broad. It is glabrous when ripe and of a bright scarlet color, beautiful to behold.

### **Crataegus durobrivensis** Sarg.

Banks of the Genesee river in the northern part of Rochester. Near North Albany. It has also been found at Niagara Falls by C. S. Sargent and at Buffalo by J. Dunbar. The Rochester thorn has flowers with 20 stamens, rose-red anthers and 4-5 styles. The calyx lobes are slightly hairy inside, the fruit is globose or nearly so and is said to persist on the branches till midwinter. The species has been placed by Professor Sargent in the section Dilatatae, though somewhat aberrant in its characters. In our synopsis of the species we have placed it temporarily in the section Lobulatae, from which it diverges in its more numerous stamens.

### **Crataegus acclivis** Sarg.

Steep banks of the Genesee river in the northern part of Rochester. It has also been found at Rush by M. S. Baxter and at Niagara Falls by C. S. Sargent. It is a large fine species easily recognized by its nearly erect branches and its large bright red fruit which is generally a little longer than broad. It sometimes retains, when ripe, some of the hairiness which is so noticeable on the calyx at flowering time. A peculiar feature of the species consists of the broad, lunate, coarsely serrate and persistent stipules which are found on young and vigorous shoots. The lowest pair of lobes on some of the large leaves of these shoots is larger than the others. The flowers have 5-7 stamens with pink anthers. This and the next following species belong to the section Lobulatae.

### **Crataegus pedicellata** Sarg.

Rochester. The pedicellate thorn is a large, handsome and attractive species scarcely less beautiful in fruit than in flower. The fruit is either oblong or pyriform and of a bright scarlet color. It is crowned by the generally persistent, erect or incurved, glandular serrate calyx lobes. Its 10 stamens have rose-red anthers.

The 10 following species belong to the section Tenuifoliae.

### **Crataegus parviflora** Sarg.

Seneca park, Rochester. It has also been found at Rush by M. S. Baxter. It may be recognized when in bloom by its loose clusters of small flowers supported on long, branched, slender peduncles. The stamens are 5-6, the anthers pink and the styles 2-3.

### **Crataegus streeterae** Sarg.

Genesee Valley park, Rochester. A peculiar feature of this species is the long acuminate point of its leaves. The blades of some of the leaves of vigorous young shoots are more or less wrinkled. The stamens are 7-10, the anthers rose-red and the styles 3-4.

### Crataegus glaucophylla Sarg.

Seneca park and Genesee Valley park, Rochester. Westport, Essex co. In the typical form of this species the leaves at flowering time have a glaucous bloom on the upper surface and are pale and glaucous beneath. This glaucous bloom is sometimes wanting. The stamens vary from 5-10 and the anthers are rosy red. On vigorous shoots the leaves are sometimes slightly cordate. The fruit is longer than broad, bright red or scarlet and sometimes hangs on the branches long after the leaves have fallen.

### Crataegus ornata Sarg.

Genesee Valley park, Rochester. Found also at La Salle, Niagara co., by J. Dunbar. On fertile branches the leaves are often oblong ovate but on vigorous young shoots they are broadly ovate. The stamens are 10, the anthers rose-red and the styles 2-3. The fruit hangs in drooping clusters, is of a bright scarlet color and quite ornamental.

### Crataegus rubicunda Sarg.

Genesee Valley park, Rochester. It has been found at Buffalo by J. Dunbar. It closely resembles the preceding species, from which it differs in the slight hairiness of the calyx and pedicels, in the red flesh of the fruit and in the yellowish green color of the foliage.

### Crataegus tenuiloba Sarg.

River bank south of Rochester. The thin lobed thorn has ovate or broadly ovate leaves and is similar in its general characters to the two preceding species but it differs from them in having smaller, fewer flowered clusters and in its bright scarlet fruit which is gradually narrowed toward the base.

### Crataegus colorata Sarg

Genesee Valley park, Rochester. It has also been found at Murray, Orleans co. by M. S. Baxter and at Buffalo by J. Dunbar. It differs from the five preceding species in having its ripe fruit crimson instead of scarlet. Its stamens are 10, anthers rose-red and styles 3-4. Its branches bear numerous spines which are slender or stout, straight or curved.

### Crataegus beckwithae Sarg.

Genesee Valley park, west side of the river, Rochester. The Beckwith thorn differs from all the preceding species of this section in its globose fruit, It is sometimes full and rounded at the base and sometimes pointed. It is dark crimson when ripe and its flesh is tinged with red. The calyx lobes at flowering time are marked on the inside toward the tips with minute white dots. This peculiar character is present in all our flowering specimens. The leaves are broadly ovate or almost triangular. On vigorous young shoots some of them are slightly cordate.

### Crataegus dunbari Sarg.

East bank of the Genesee river in the northern part of Rochester. It has also been found at Adams Basin by M. S. Baxter and in Delaware park, Buffalo by J. Dunbar. The Dunbar thorn differs decidedly from all the preceding species of this section in its leaves which are oval or suborbicular and become much thicker and firmer with age. The fruit is globose or subglobose and crimson when ripe. The stamens are 10, anthers red, styles 3-4.

### Crataegus benigna Sarg.

Genesee Valley park, Rochester. The benignant thorn is unlike any of the previously recorded species of this section in having 15-20 stamens. The anthers are red and the fruit, which is longer than broad, is scarlet. The leaves are often truncate or slightly cordate at the base, specially on leading vigorous shoots.

### Crataegus cupulifera Sarg.

Seneca park, west side, Rochester. It has also been found at Rush and Honeoye lake by M. S. Baxter, and at Buffalo by J. Dunbar. The cup-bearing thorn has the flowers cup-shaped. The stamens are 10, the anthers pink, the styles 3-4 and the calyx lobes hairy inside. The fruit is globose or nearly so and is scarlet when ripe.

### Crataegus macauleyae Sarg.

Genesee Valley park, Rochester. The Macauley thorn may readily be distinguished from the preceding one by its 20 stamens with pale yellow anthers. It has 4-5 styles and its ripe fruit is crimson and has a more prominent calyx rim. The fruit in both is nearly alike in size and shape. Both species belong to the section Coccineae.

### Crataegus gemmosa Sarg.

Genesee Valley park, Rochester. In this species the leaves are oval or occasionally rhomboidal or obovate. The stamens are 20, anthers rose-red and styles 2-3. The ripe fruit is scarlet, a little longer than broad and crowned with a calyx rim. The calyx lobes are hairy inside, reflexed and fringed on the margin with long stipitate glands.

### **Crataegus deweyana** Sarg.

Hagaman swamp near Rochester. It has also been found at Rush by M. S. Baxter. In the Dewey thorn the leaves are ovate or broadly ovate and sharp pointed or acuminate. The stamens are 7-10, the anthers dark rose-red and the styles 2-3. The ripe fruit is scarlet, globose or subglobose and destitute of a calyx rim. The calyx lobes are not strongly or conspicuously glandular serrate.

### **Crataegus ferentaria** Sarg.

Near the roundhouse of the Pennsylvania Railroad, Rochester. The light armed thorn has oval or rhomboidal leaves acute at the apex and rounded or broadly cuneate at the base. The petioles are generally less than half an inch long and they often become red toward the end of the season. The stamens are 10, anthers pale yellow, styles two and calyx lobes distinctly glandular serrate. The ripe fruit is crimson, globose or subglobose and destitute of a prominent calyx rim. The ventral cavities of the nutlets are deep and sometimes crowd upon or cut through the lateral walls.

### **Crataegus laneyi** Sarg.

Genesee Valley park, Rochester. The Laney thorn may be distinguished from the three preceding species by its having 10-15 stamens, pale yellow anthers, 2-4 styles and a villose inflorescence. It and the other three species mentioned belong to the section Tomentosae.

### **Crataegus tatnalliana** Sarg.

North and west of North Albany. In this plant the fruit is globose or oval, and the leaves are often more or less twisted or contorted on the margin, as if there was an excessive development of tissue in that part of the blade. In the leaves of C. pringlei the reverse condition appears to prevail. The margin of the leaf is decurved, apparently because of a deficient development of the marginal tissue or an excessive development of the central portion of the leaf. This makes the leaf convex above, concave beneath.

### **Crataegus hudsonica** Sarg.

Tivoli hollow between Albany and West Albany. This species is closely related to C. suborbiculata Sarg. and like that species it has suborbicular leaves. It differs from it in having the leaf lobes more sharp pointed, in having fewer styles and nutlets and in its globose mostly drooping and uniformly red fruit. Its styles and nutlets are generally 3. Its flowers open about May 20 and its fruit is ripe about the middle of October.

Of the 35 species of Crataegus here recorded, specimens of 33 were collected in and near Rochester. In order to indicate more clearly the distinguishing features of the Rochester species, some of which resemble each other very closely, the following synoptic tables of the sections and species have been prepared. The table of the sections is intended to include only the Rochester species. A few species found in and about Rochester but not recorded in the preceding pages, they having been previously reported, have been included in the table of species. They are Crataegus crus-galli, C. punctata, C. pringlei, C. holmesiana, C. matura, C. macracantha, C. succulenta and C. tomentosa.

### Synopsis of the sections

Nutlets with the ventral faces excavated........Tomentosae
Nutlets with the ventral faces not excavated............. 1
1 Leaves gradually narrowed to a short petiole.............. 2
1 Leaves not having this character......................... 3
2 Upper surface of the leaves shining.......... . Crus-galli
2 Upper surface of the leaves not shining.........Punctatae
3 Fruit large, more than 6 lines long........................ 4
3 Fruit medium or small, 6 lines long or less................. 5
4 Flower clusters hairy, ripe fruit more or less hairy except in C. spissiflora...............Molles
4 Flower clusters hairy or glabrous, ripe fruit glabrous except in C. acclivis.................Lobulatae
5 Fruit distinctly pruinose before ripening............Pruinosae
5 Fruit not distinctly pruinose before ripening.............. 6
6 Leaves thin, glabrous except when young......Tenuifoliae
6 Leaves becoming thick or subcoriaceous with age....... 7
7 Fruit falling while yet hard........................Intricatae
7 Fruit becoming soft before falling..................Coccineae

### Synopsis of the species

CRUS-GALLI

| | |
|---|---|
| Stamens 10 | C. crus-galli |
| Stamens 10–20 | C. persimilis |

PUNCTATAE

| | |
|---|---|
| Stamens 20 | C. punctata |

### MOLLES

| | | |
|---|---|---|
| | Stamens 15–20 | C. fulleriana |
| | Stamens 8–10 | 1 |
| 1 | Ripe fruit hairy | 2 |
| 1 | Ripe fruit glabrous | C. spissiflora |
| 2 | Some of the mature leaves convex | C. pringlei |
| 2 | None of the mature leaves convex | C. ellwangeriana |

### LOBULATAE

| | | |
|---|---|---|
| | Stamens 20 | C. durobrivensis |
| | Stamens 10 | C. pedicellata |
| | Stamens 5–8 | 3 |
| 3 | Fruit hairy | C. acclivis |
| 3 | Fruit glabrous | C. holmesiana |

### PRUINOSAE

| | | |
|---|---|---|
| | Stamens 15–20, anthers red or maroon | 4 |
| | Stamens 15–20, anthers pale yellow or whitish | 5 |
| | Stamens 7–10 | 6 |
| 4 | Anthers dark maroon color | C. beata |
| 4 | Anthers red | C. lennoniana |
| 5 | Fruit ripe in November, calyx rim prominent | C. leiophylla |
| 5 | Fruit ripe in October, calyx rim absent | C. formosa |
| 6 | Fruit longer than broad | 7 |
| 6 | Fruit not longer than broad | 8 |
| 7 | Fruit bitter, anthers red | C. compta |
| 7 | Fruit sweet, anthers purple | C. diffusa |
| 8 | Leaves on vigorous shoots often trilobed, anthers red | C. opulens |
| 8 | Leaves on vigorous shoots not trilobed, anthers purple | C. maineana |

### INTRICATAE

| | | |
|---|---|---|
| | Fruit subglobose, 6 lines long | C. baxteri |
| | Fruit oblong or obovate, 4–5 lines long | C. verecunda |

### TENUIFOLIAE

| | | |
|---|---|---|
| | Fruit longer than broad | 9 |
| | Fruit not longer than broad | 14 |
| 9 | Stamens 5–6, anthers pink, fruit crimson | C. parviflora |
| 9 | Stamens 7-10, anthers red, fruit scarlet | C. streeterae |
| 9 | Stamens 7-10, anthers purple, fruit scarlet | C. glaucophylla |
| 9 | Stamens 10 | 10 |
| 9 | Stamens 15-20 | C. benigna |

| | | |
|---|---|---|
| 10 | Fruit narrowed toward the base, obconic | C. tenuiloba |
| 10 | Fruit not obconic | 11 |
| 11 | Ripe fruit scarlet | 12 |
| 11 | Ripe fruit crimson | 13 |
| 12 | Pedicels and calyx glabrous | C. ornata |
| 12 | Pedicels and calyx slightly hairy | C. rubicunda |
| 13 | Fruit ripe in August | C. matura |
| 13 | Fruit ripe in September | C. colorata |
| 14 | Leaves triangular ovate, styles 5 | C. beckwithae |
| 14 | Leaves oval or suborbicular | C. dunbari |

### COCCINEAE

| | |
|---|---|
| Stamens 10, anthers pink, fruit scarlet | C. cupulifera |
| Stamens 20, anthers pale yellow, fruit crimson | C. macauleyae |

### TOMENTOSAE

| | | |
|---|---|---|
| | Stamens 20, anthers red | 15 |
| | Stamens 10, anthers pale yellow | 16 |
| | Stamens 7-10, anthers red | C. deweyana |
| | Stamens 10-15, anthers pale yellow | C. laneyi |
| 15 | Leaves ovate or ovate oblong | C. tomentosa |
| 15 | Leaves elliptic | C. succulenta |
| 15 | Leaves orbicular | C. gemmosa |
| 16 | Fruit drooping, spines 1.5-2.5 inches long | C. ferentaria |
| 16 | Fruit erect, spines 2.5-4 inches long | C. macracantha |

### **Dipsacus laciniatus** L.

Near Beaver park, Albany. August. This is a recently introduced species but it appears to be well established here but being within the city limits it may not persist many years. It may be distinguished from the common teasel, D. sylvestris, by its laciniate or pinnatifid leaves. Its flowers are paler than in that species.

### **Eocronartium typhuloides** Atk.

Living moss, Anomodon attenuatus. Cascadilla woods near Ithaca. July. G. F. Atkinson.

### **Falcata pitcheri** (T. & G.) Kuntze

North Greenbush and West Albany. This species is not very unlike F. comosa, (Amphicarpaea monoica of the older botanies) with which it was formerly united. It is chiefly distinguished by its larger leaves and the tawny villosity of its stem.

**Fusarium aquaeductuum** R. & R.

Refrigerator drains. Geneva. September. F. C. Stewart. Our specimens of the "refrigerator fungus" were taken from the drainpipe of a house refrigerator. The fungus sometimes multiplies till it chokes the drain and stops the outflow of the water.

**Galera capillaripes** Pk.

North Elba, Essex co. August. This little mushroom resembles Galera tenera in color, but it is much smaller and has a very slender, almost filiform stem, more narrow and distant lamellae and smaller spores.

**Geranium bicknellii** Britton

Ledges and rocky places. Near Brownsville, Jefferson co. June. C. H. Peck. Little Falls. October. J. V. Haberer.

**Gyrostachys ochroleuca** Rydb.

Roadsides and pastures in rather dry soil. Lake Pleasant. August. C. H. Peck. Dry hillsides, near Ballston lake. S. H. Burnham. This species is closely allied to G. cernua.

**Hexagona micropora** Murrill

Dead branches. Verona, Oneida co., and South Bay, Madison co. July.

This species is closely related to and was formerly included in Hexagona alveolaris (DC.), which is equivalent to Favolus europaeus Fr. It may be separated from it, by its smoother pileus and smaller pores.

**Hypholoma rugocephalum** Atk.

Low moist ground. Port Jefferson. August. G. F. Atkinson. This species is at once recognizable by its brown rugose pileus.

**Hypomyces banningiae** Pk.

Parasitic on some mushroom which it transforms to such a degree as to render it unrecognizable. Pittsford, Monroe co. August. F. S. Boughton.

**Hypomyces inaequalis** Pk.

Parasitic on Amanita rubescens. Catskill mountains. F. H. Mickleborough. The parasite prevents the expansion of the pileus and whitens both stem and pileus. In the preceding species the spores have no septum, in this one they have a single septum near one end. They are therefore divided into two unequal parts and this suggests the specific name.

### **Lachnocladium semivestitum** B. & C.

Low marshy places. Smithtown. August. G. F. Atkinson. This fungus might easily be mistaken for a species of Clavaria, but careful inspection shows that it is clothed toward the base by a minute downy white tomentum.

### **Lactarius brevis** n. sp.

PLATE Q, FIG. 1-5

Pileus thin, broadly convex, plane or slightly depressed in the center, glabrous, azonate, whitish, sometimes with a slight alutaceous tinge, flesh white, milk whitish, quickly changing to sulfur yellow on exposure to the air, taste acrid; lamellae thin, narrow, crowded, adnate, whitish or pallid; stem short, equal or slightly tapering downward, solid or somewhat spongy within, glabrous, white; spores subglobose, .0003 of an inch long, .00025-.0003 broad.

Pileus 1-2 inches broad; stem about 1 inch long, 2-4 lines thick. This species is closely related to L. theiogalus from which it may be separated by its white or whitish color, its smaller size, solid or stuffed stem and the absence of tomentum from the base of the stem.

### **Lactarius colorascens** n. sp.

Pileus thin, nearly plane, becoming centrally depressed, moist, glabrous, whitish or pallid when young, becoming brownish red with age, milk white, changing to sulfur-yellow on exposure to the air, taste bitter; lamellae thin, close, adnate or slightly decurrent, whitish, becoming yellowish with age; stem equal, solid, even, whitish, becoming brownish red with age; spores globose, rough, .0003 of an inch in diameter.

Pileus 1-2 inches broad; stem 1-1.5 inches long, 2-3 lines thick.

Woods. Port Jefferson. August. G. F. Atkinson. In the mature plant the color is similar to that of L. camphoratus, but the species is very distinct in the color of its milk and in its bitter taste.

### **Pholiota appendiculata** n. sp.

PLATE P, FIG. 8-17

Pileus fleshy, firm, broadly convex or nearly plane, viscid when moist, shining, squamose with appressed spotlike scales, appendiculate on the margin with fragments of the veil, dark red when young, soon fading to pink and sometimes becoming yellowish brown or grayish brown, flesh at first purplish red, specially in the lower part, whitish or pale yellow when mature; lamellae thin, close, rounded behind, adnexed or decurrent with a tooth, pale yellow or almost white, becoming brownish; stem short, firm, solid or with a small cavity, white above, brownish and squamose below the slight evanescent annulus, white within, the veil white, at first concealing the young lamellae, soon breaking into fragments and partly adhering to the margin of the pileus, partly to the stem.

Pileus 1-3 inches broad; stem about 1 inch long, 2-4 lines thick.

Decaying sawdust. McLean, Tompkins co. July. The annulus consists of a row of scales or fragments of the veil around the upper part of the stem, the greater part of the veil usually adhering to the margin of the pileus. The color of the spores prevents the reference of the species to the genus Hypholoma.

### **Salix serissima** (Bail.) Fern.

North Elba and Lake Bonaparte. June. This willow has recently been separated from Salix lucida to which it was formerly joined as a variety. Its leaves are merely acute or short pointed at the apex, paler on the lower surface, very finely glandular serrate, the petioles have 1-3 pairs of glands at the top and the fertile aments are very late in ripening their capsules.

### **Scirpus occidentalis** (Wats.) Chase

Oneida lake, Thompson lake and Lake Bonaparte. This bulrush was formerly considered a variety of Scirpus lacustris, but it has recently been published as a distinct species. It is distinguished from S. lacustris by its two cleft style, its smaller lenticular achene and its pubescent scales.

### **Sisyrinchium arenicola** Bickn.

Sand barrens between Rossville and Kreischerville, Richmond co. May. S. H. Burnham.

### **Stachys sieboldi** Miq.

Cinder dumps along the railroad north of Whitehall. September. S. H. Burnham. Introduced.

### **Teucrium boreale** Bickn.

Low moist ground. South side of Oneida lake. J. V. Haberer.

### **Uredinopsis atkinsonii** Magn.

Living fronds of the marsh shield fern, Dryopteris thelypteris. Near Ithaca. August. G. F. Atkinson.

**Uredinopsis osmundae** Magn.

Living or languishing fronds of cinnamon fern, Osmunda cinnamomea. Near Malloryville, Tompkins co. August. G. F. Atkinson.

**Viola amoena** LeConte

Wet places. Common in hilly and mountainous districts. In *Flora of the State of New York* this is united with Viola blanda, but as the tendency at the present time is toward the separation of closely related forms it seems best to restore this violet to its original specific rank.

**Viola latiuscula** Greene

Light gravelly soil. Minerva. This species was found in flower early in May. In our specimens the lower leaves have a slight purplish tinge.

**Viola septentrionalis** Greene

Borders of woods and grassy places. Warrensburg, Warren co., and Minerva, Essex co. The northern blue violet was found in flower the last week of May. Its lower leaves are small, reniform or suborbicular, its upper ones are bluntly pointed and its sepals are ciliate.

**Xyris montana** Ries

Borders of White lake, Forestport, Oneida co. July. J. V. Haberer. It also occurs in Cranberry marsh, Sandlake, Rensselaer co. It was formerly thought to be a variety of X. flexuosa, but it is now separated as a distinct species.

**Zygodesmus granulosus** Pk.

Decaying wood of poplar. East Schaghticoke. August.

## REMARKS AND OBSERVATIONS

**Agaricus abruptus** Pk.

In his *Monograph I*, p. 348, Elias Fries described a mushroom under the name Agaricus abruptus. In *Hym. Eur.*, p. 245, he placed this species in his subgenus Flammula, still retaining for it the original name. In *Sylloge* the subgenus Flammula, with many other subgenera of Fries, was given generic rank and the name Agaricus abruptus was changed to Flammula abrupta, thus vacating the name Agaricus abruptus and leaving it available for some other application. But Rule 5 of what is known as the Rochester code forbids the use of such names, and though this rule may not be accepted in its present form by the coming international congress of botanists, I have thought it best to change the name Agaricus abruptus Pk. and several other names given under similar conditions, so that they shall not conflict with this rule. I therefore substitute the name

Agaricus abruptibulbus for Agaricus abruptus Pk. N. Y. State Mus. Mem. 4, p. 163

Agaricus chlamydopus for Agaricus cothurnatus Pk. Torr. Bot. Club Bul. 31, p. 181

Agaricus halophilus for Agaricus maritimus Pk. Torr. Bot. Club Bul. 26, p. 66

Agaricus magniceps for Agaricus magnificus Pk. Torr. Bot. Club Bul. 26, p. 67

Agaricus micromegethus for Agaricus pusillus Pk. N. Y. State Mus. 54th An. Rep't, p. 152

Agaricus praerimosus for Agaricus tabularis Pk. Torr. Bot. Club Bul. 25, p. 325

Agaricus pilosporus for Agaricus sphaerosporus Pk. Torr. Bot. Club Bul. 31, p. 181

Agaricus cothurnatus Fr. is considered in *Sylloge* the equivalent of Stropharia cothurnata Fr. In like manner

Agaricus maritimus Fr. is Inocybe maritima Fr.

Agaricus magnificus Fr. is Amanita magnifica Fr.

Agaricus pusillus Pers. is Volvaria parvula Weinm.

Agaricus tabularis Pers. is Tricholoma grammopodium (Bull.)

Agaricus sphaerosporus Krombh. is Lepiota naucina Fr.

### **Antennaria canadensis** Greene

Near North Albany. May. This species is common in the northern and eastern part of the State, but the staminate plants are rarely seen. I have found them only in the single locality here indicated.

### **Blephariglottis ciliaris** (L.) Rydb.

Karner. July. This is Habenaria ciliaris R. Br. in Gray's *Manual.* It is a rare species in our State at the present time, but it is said to have been more common many years ago. In New York State Cabinet of Natural History, 18th Rep't, p. 136, it is recorded as having been found on the Pine plains of Schenectady but in my numerous botanizing trips in this region it was not found till this year. It appears to have recently become established in the Karner locality, as it was found in a place frequently visited before. The plants were few and were growing among low shrubs in a rather dry place. The flowers are very beautiful.

### **Blephilia hirsuta** (Pursh) Torr.

Low moist ground. East Schaghticoke. August. Rare.

### **Botrychium obliquum** Muhl.

This grape fern is common in Oneida county, and is as variable as it is common. Dr Haberer has collected numerous specimens of it in the vicinity of Utica and has contributed to the herbarium a fine series of specimens representing all of our published varieties of it.

### **Cantharellus cinnabarinus** Schw.

This small chantarelle was found in abundance near Port Jefferson in August. In one station several forms of it were growing in close proximity. In one form the whole plant had the usual cinnabar red color, but in some of the plants the stem was hollow. In another form the color of the pileus and stem was red as usual, but the lamellae were yellow. In a third form the cap was pale pink as if its normal color had faded. A fourth had pale pink lamellae and the margin of the pileus was strongly curved upward, making the pileus appear narrow and giving the whole plant a club shape. In a fifth form the whole plant was yellow. In all except the first the stem, so far as investigated, was hollow. But the most remarkable thing in the variations is the difference in the color of the spores. We are disposed to consider the color of the spores in any given species as one of its most constant and reliable characters. But in this case the plants with red or pink lamellae had spores that appeared pink in the mass, those with yellow lamellae shed yellow spores. Yet the spores were alike in size and shape, and we are obliged to conclude that all these forms belong to one species.

### **Carex castanea** Wahl.

This rare sedge was credited to Essex county in the *Flora of the State of New York*, on the authority of Dr Kneiskern. In my own explorations in the county I had never met with it till the past season. It was found growing sparingly near Minerva. It is an early flowering species. It is Carex flexilis Rudge.

**Carex formosa** Dew.

This rare species was found in Seneca park, Rochester, on June 1. It was then in good condition for collecting.

**Carex setifolia** (Dew.) Britton

Limestone rocks, cliffs and precipices are generally given as the habitat of this pretty little sedge. But it is not limited to such places. Fine specimens of it were found in July growing in wet, mucky soil in woods about Bergen swamp. In more open wet places near it the rare Carex crawei Dew. was found.

**Cercospora circumscissa** Sacc.

This fungus was plentiful in the region about Lake Pleasant the past season. It attacks the living leaves of the chokecherry and the wild blackcherry. It kills the leaf tissues in small circular spots, and the dead tissues soon separate from the living and fall, leaving clean-cut circular perforations in the leaf.

**Cypripedium reginae** Walt.

A form of this showy species occurs in Bonaparte swamp in which the whole flower is white.

**Eleocharis palustris vigens** Bail.

This is a tall stout variety growing in shallow water. It was found growing in Oneida lake at Lakeport and specimens were collected. Variety glaucescens was found growing in low wet places at South Bay and in Bonaparte swamp. Judging from the external appearance alone it would be difficult to believe that these two plants are varieties of the same species.

**Eriophorum alpinum** L.

The alpine cotton grass is now plentiful in one place in Bonaparte swamp though it was not seen in my exploration of the swamp in 1899. It is also abundant in an old meadow near Elm lake in Hamilton county.

**Fragaria americana** (Porter) Britton

This strawberry is abundant in groves and the borders of woods at Lake Bonaparte. The flowers are scarcely more than 3 lines broad.

**Gratiola aurea** Muhl.

Fine specimens with slender weak stems a foot or more long were found growing in the marshy borders of a lake near Smithtown, Suffolk co.

**Hieracium praealtum** Vill.

This noxious weed has become very abundant in Lewis county. From Lyon Falls to Carthage it is plentiful along the railroad, in pastures and meadows and by roadsides. It is also common along the Carthage and Adirondack Railroad. It rivals buttercups and daisies in giving color to meadows infested by it. The orange hawkweed, Hieracium aurantiacum, which is associated with it in some places and which is no less pestilential, was not seen here.

**Hydnum adustum** Schw.

An unusual form of this fungus was found in the western part of the State by G. E. Morris. The pileus is shaped like the bowl of a goblet by the upward curving of its margin and the stem is central. The whole plant is white.

**Hygrophorus laurae decipiens** n. var.

Pileus thin, stem slender, less than 6 lines thick, generally cespitose and attenuated at the base, pileus not changing color in drying, gills also nearly unchangeable. Edible. Near Elm lake, Hamilton county. September.

**Hypholoma sublateritium** (Schaeff.) Fr.

In October specimens of the brick-red hypholoma were sent to me with the statement that two persons who had eaten stewed mushrooms of this kind had been made sick by them. In one case "a severe headache with tingling and numbness in hands and arms and a feeling of general weakness and relaxation" developed in 15 hours after eating and lasted half an hour. In the other case the person "was attacked with violent nausea and purging." The difference in the symptoms of the two persons and the long time between the eating and the development of the symptoms led me to think that the mushrooms were not responsible for the sickness. It seemed to me that by some mistake the samples sent me were not the same kind as those that had been eaten or that the sickness was due to some other cause. As the samples sent me were still in fairly good condition, I concluded to try their edible quality myself. Three caps were selected, fried with butter and eaten. No harm and no unpleasant results followed, and my opinion of the innocence of the mushrooms was confirmed.

It is proper to add that in the typical form of the species the taste is said to be bitter, but in these specimens no bitter flavor was perceptible, though in other respects they exhibited the characters of the species.

### **Juniperus nanus** Willd.

A large form of this juniper occurs at Lake Bonaparte. It forms circular patches as usual, but the branches are more erect and much taller. They are 6-8 feet tall and have a basal diameter of 2-4 inches. The leaves are 4-6 lines long and sometimes abruptly sharp pointed, sometimes gradually tapering into a subulate point. This form seems to make an approach toward Juniperus communis.

### **Limnorchis dilatata linearifolius** Rydb.

Hidden lake, Herkimer county. J. V. Haberer. This variety may be distinguished from the typical form of the species by its more narrow linear leaves.

### **Marasmius resinosus niveus** Pk.

As there is a Marasmius niveus Mont. a rigid observance of the rules of the Rochester code requires that this variety name should be changed. I therefore substitute for the name given in the report for 1902, p. 38, Marasmius resinosus candidissimus.

### **Osmunda claytoniana** L.

This common fern sometimes grows in "fairy rings." Three examples of this kind of growth were seen at Lake Pleasant. In one there was a continuous line of fronds forming an ellipse of which the long diameter was about 3 feet. In another they formed about three fourths of the circumference of a circle, the line being interrupted in one place. In the third example the line was continuous and formed the circumference of a circle of which the diameter was about 2 feet. All the rings were near each other in a meadow.

### **Oxalis cymosa** Small

This is a common species in the eastern part of the State. It is very variable, being glabrous or villose above and glabrous below or wholly villose. Its flowers are usually yellow, but sometimes they are very pale yellow or almost white. The color of the stem and leaves varies from yellowish green to purplish brown.

### **Phacelia dubia** (L.) Small

Near Jamesville, Onondaga co. May. Mrs L. L. Goodrich. The specimens are in fine flowering condition. Specimens collected and sent by Mrs Goodrich in October 1903 were also in flower. The two sendings show that the plant may flower either in spring or in autumn.

### **Picea canadensis** (Mill.) B. S. P.

Lake Pleasant. June. The white spruce occurs sparingly in various parts of the Adirondack region. All of our spruces as well as the hemlock drop their leaves from the drying branches in consequence of which it is difficult to prepare satisfactory herbarium specimens. I have tried in various ways to overcome this difficulty and have inquired of many botanists both of this country and of Europe if they could tell me how to prepare specimens of these branches so that they might retain their leaves. Recently Mr William Richards gave me a recipe which was intended to meet this difficulty. It was taken to a druggist who prepared a sufficient quantity for trial. As soon as opportunity was given, specimens of suitable size both of the white spruce and the black spruce were taken and treated according to directions. The result has been quite satisfactory. The specimens have dried and retained their leaves to the present time. The color of the leaves is slightly affected, but the specimens are far more satisfactory than the bare twigs with leaves placed in packets by themselves. For the benefit of any who may wish to avail themselves of this method of preparing specimens of this kind a copy of the recipe is here given.

*Recipe*

For the treatment of fresh herbarium specimens of spruce and hemlock trees to prevent the leaves from falling from the twigs.

| | | |
|---|---|---|
| alum | 500 | gr. |
| salt | 125 | " |
| saltpeter | 60 | " |
| potash | 300 | " |
| white arsenic | 100 | " |

Dissolve in 1 quart of water, cool and filter. To 1 quart of this solution add 4 quarts of glycerin and 1 quart of alcohol.

Immerse the fresh specimens in this mixture, letting them remain in it at least 48 hours. When taken out wash away any excess of mixture adhering to them with warm water.

After the external moisture has evaporated the specimens may be placed in drying papers and put in press in the usual way. When thoroughly dry they may be mounted on the herbarium sheets and placed in the herbarium.

### **Prunus americana** Marsh.

This species of wild plum is common in the vicinity of Albany. It blossoms a little later than Prunus nigra. Its calyx lobes often terminate in two or three minute teeth.

**Prunus pennsylvanica** L. f.

A small tree of the wild red cherry was observed at Lake Bonaparte, the ripening fruit of which was white. Is it an albino?

**Pterospora andromedea** Nutt.

Port Henry. August. Miss H. A. Edwards. The contributed specimen is in fruiting condition, 35 inches long with a stem diameter of $\frac{5}{16}$ of an inch and bears more than 60 capsules. In *Flora of New York State* this species is credited to "various places in the vicinity of Albany," but it seems to have disappeared entirely from this locality. It is also credited to Port Henry, having been found there more than 60 years ago. It is gratifying to know that it still exists there.

**Rosa sayi** Schw.

Griswold's Mills, Washington co. July. S. H. Burnham. This rose also occurs in the vicinity of Westport.

**Rudbeckia hirta** L.

Two forms of this very common weed, both of which were new to the herbarium, were found by Miss C. S. Parsons in the western suburbs of the city.

**Rudbeckia laciniata** L.

This plant is subject to the attacks of a gall-producing insect. Specimens sent by Mrs Burnham from Washington county have from 1-3 globular green galls developed from the side or base of each head of flowers. In one example a branch 1.5 inches long had developed at a right angle to the stem just beneath the flower head. The branch itself bore a flower head.

**Salix amygdaloides** Anders.

A single tree of this species was found by Mr R. B. Hough at Lake Bonaparte. It is 25 or 30 feet tall, with a trunk diameter of about 8 inches. It extends the range of the species in our State farther north than before, but the species is known to occur still farther north in Canada. Its presence at Lake Bonaparte may be accidental, as only a single tree has yet been found there. To the six species of willow previously found in Bonaparte swamp, Salix cordata and Salix nigra should be added, making eight species in all.

**Sarracenia purpurea** L.

Two specimens of the pitcher plant were found growing on the margin of the roadbed of the railroad that runs through Bonaparte swamp. This roadbed is a sandy gravel of which a component part is decomposed crystalline limestone, which is abundant in that vicinity. The plants were only a few inches above the general level of the swamp. Both were in flower, but the flowers were very abnormal. Instead of the usual sepals, petals and stamens, there were numerous oblong or spatulate petaloid organs, green on the inner surface and more or less tinged with reddish brown on the outer. In one there were about 30, in the other about 45 of these pseudopetals. The ovary was imperfectly developed and the usual peltate stigmatic disk was transformed into erect irregular folded or crumpled leaflike lobes. The whole flower was suggestive of a "double blossom" of greenish petals. The unnatural habitat of limestone gravel and sand was the only apparent cause of the transformation. Other plants with flowers of the usual kind were growing near these, but in the soft wet soil of the swamp.

### **Silene vulgaris** (Moench) Garcke

Machias, Cattaraugus co. July. F. E. Fenno. This is a peculiar form having few flowered simple stems and narrowly elliptic or ovate leaves.

### **Stereum spadiceum** Fr.

A form of this species was found near Port Jefferson in which the pilei were crispate complicate as in Stereum complicatum.

### **Vagnera stellata** (L.) Morong

The fruit of the star-flowered Solomon's seal is described in our botanies as sometimes black, and sometimes green with six black stripes. A form was found in Bergen swamp the fruit of which was green with three black stripes.

### **Viburnum lentago** L.

The leaves of this species are described as ovate. A form was found near Delanson, Schenectady co. of which the leaves vary from very broadly ovate to nearly orbicular. Another form was found on Crown Point of which the leaves are oblong and pointed at each end. Its fruit is destitute of bloom and ripens earlier than in the typical form. This may prove worthy of varietal distinction.

### **Viola palmata dilatata** Ell.

Wooded hillside near Saugerties. May. In these specimens some leaves have the broad central lobe, others are not lobed at all. It seems to be intermediate between the variety and an entire leaved form.

**Viola papilionacea domestica** (Bickn.) Poll.

Streets and waste places of Port Jefferson. August. This so called variety is so unlike the typical form of the species that to most minds it would be far more satisfactory to consider it a distinct species unless there are connecting forms.

## EDIBLE FUNGI

### Lepiota cepaestipes Sow.

ONION-STEMMED LEPIOTA

PLATE 87, FIG. 1–5

Pileus thin, fleshy in the center, ovate or obtusely conic, becoming campanulate or expanded, broadly umbonate, soon squamulose except in the center, dry, plicate striate on the thin margin, white, the umbo and squamules brownish, flesh white, taste mild; lamellae thin, narrow, close, free, white; stem slender, enlarged toward the base, slightly mealy pruinose or glabrous, stuffed or hollow, white, the slight annulus sometimes evanescent; spores white, .0003–. 0004 of an inch long, .0002–.0003 broad.

The onion-stemmed lepiota takes its name from the peculiar shape of the lower part of the stem. There is an enlargement below the middle which gives the stem a shape similar to that of the flowering stem of an onion. The flesh of the cap is thin except in the center where it is thickened into a prominence or umbo. On the margin it is very thin and marked by closely placed radiating furrows or striations with narrow ridges or folds between them. The surface of the cap is covered by a dense flocculent coat or veil which soon breaks into minute scales or points and with the expansion of the cap they give it a roughened or dotted appearance. The veil however remains entire on the umbo and gives it a brownish color. The cap is dry, flexible and slightly tough. The gills are closely placed side by side and do not reach the stem. They are minutely floccose on the edge and white while young and fresh, but they assume a brownish hue with age or in drying, similar to that assumed by the gills of the smooth lepiota, L. naucinoides, under the same conditions.

The stem is rather long and except in the enlarged part is scarcely thicker than the stem of an ordinary tobacco pipe. Occasionally the enlargement is absent and the diameter of the stem is about the same from top to bottom. In the young plant it is stuffed with a webby pith, but usually it becomes hollow with age. The surface is covered with a slight mealiness but this may disappear when the plant is old. It is white or whitish. This mushroom generally grows in tufts or close clusters in rich soil, tan bark, sawdust or decomposing vegetable matter. It is perhaps found quite as often in greenhouses or conservatories as in the open air. Our specimens were found growing in a bed of decaying sawdust in the open air. The heat generated by the decaying sawdust was doubtless very acceptable to it. A yellow form of the species is said to occur but I have not met with it in my explorations. In my trial of its edible qualities it seemed to me to have an excellent flavor but a slightly tough texture. According to one author "the entire fungus is tender and delicious cooked in any way."

### **Hygrophorus nitidus** B. & C.

### SHINING HYGROPHORUS

PLATE 88, FIG. 1–7

Pileus thin, fragile, convex, umbilicate, viscose, pale yellow, shining, and striatulate on the margin when moist, whitish when dry; lamellae arcuate, distant, decurrent, pale yellow; stem slender, viscose, hollow, colored like the pileus; spores broadly elliptic or subglobose, .00025–.0003 of an inch long, .0002-.00025 broad.

The shining hygrophorus is a small species of a beautiful yellow color throughout. Both cap and stem are very viscid and both are fragile. The cap has a conspicuous central depression or umbilicus. When moist, obscure radiating lines may be seen on the margin. These are merely the shadowy appearance of the gills beneath and are due to the thin translucent character of the margin. As the moisture escapes from the cap it becomes whitish and the shadowy lines disappear. The gills are wide apart and their inner end is gradually narrowed and extends downward on the stem. In dried specimens the interspaces are usually wrinkled or venose, specially in large specimens. The stem is rather long in proportion to the size of the cap. It is so viscid and fragile that it is difficult to pull a specimen from the ground without breaking it. In some cases the stem is gradually thickened as it enters the cap. It and the gills usually retain their color longer than the cap.

The cap is rarely more than 1 inch broad; the stem is 1.5-3 inches long and 1-2 lines thick. The species is generally gregarious in its mode of growth, but sometimes it is cespitose. It grows in moist soil full of humus in swamps or low damp places. As an edible mushroom it is not very important because of its small size, but it is tender and agreeable in flavor and may sometimes be convenient to add to a scanty supply of larger species. It is found in July and August.

### **Hygrophorus laurae decipiens** Pk.

DECEIVING HYGROPHORUS

PLATE 88, FIG. 8-11

Pileus thin except in the center, broadly conic with involute margin when young, becoming convex or nearly plane, glutinose, white with a dingy yellow or smoky brown spot in the center, flesh white, taste mild; lamellae subdistant, adnate or decurrent, white; stem rather long, slender, viscid when moist, solid, attenuate at the base, white with white particles at the top; spores .00028-.0003 of an inch long, .00016-.0002 broad.

The deceiving hygrophorus is most closely related to the laura hygrophorus, from which it can scarcely be separated in the fresh or living condition. The thinner flesh of the cap, the more slender stem more constantly narrowed and pointed at the base and its tufted mode of growth are the principal marks of distinction in the fresh plant. It is likely to be taken for a slender tufted form of the laura hygrophorus and the persistency of its colors in drying is the chief reason for considering it a variety of the species instead of a mere form. The cap is 1.5-3 inches broad; the stem 1.5-2 inches long, 3-5 lines thick. It grows in tufts among fallen leaves in woods or their borders, and may be found in September. Its edible character is similar to that of the laura hygrophorus.

### **Boletus laricinus** Berk.

LARCH BOLETUS

PLATE 89, FIG. 1-7

Pileus fleshy, broadly convex or nearly plane, viscid when moist, sometimes squamose, dingy white or grayish white, flesh white; tubes short, adnate or slightly decurrent, whitish when young becoming darker and brown with age, their mouths large, angular, subcompound; stem short, solid, annulate, reticulate above the ring, grayish or brownish below; spores brown, oblong .0004-.0005 of an inch long, .00016-.0002 broad.

The larch boletus takes its name from its place of growth. It always grows under or near larchtrees. It is closely related to the Elba boletus, B. elbensis Pk., which is found under or near tamarack trees in the northern part of our State. In the larch boletus the cap is paler and has no pinkish brown tint which often is seen on the cap of the Elba boletus. Its cap is sometimes adorned by brown or blackish scales which are easily rubbed or washed away, leaving the whitish cap entirely naked. The flesh is soft and white or whitish. The tubes are at first whitish but they change with age to brownish and then to a dark sepia color. The mouths are large and angular. In some cases shorter dissepiments within the larger tubes give them the appearance of being composed of two or more smaller ones. The tube walls extend downward on the stem to the ring and by anastomosing give the reticulated appearance called cribrose in the older descriptions. This is one of the distinguishing characters between the larch boletus and the Elba boletus. I have not yet tested the edible qualities of the latter, but the former is worthy of a place among our esculent species. It was collected in October.

### **Boletus rubropunctus** Pk.

### RED DOTTED BOLETUS

PLATE 90, FIG. 1-9

Pileus fleshy, very convex or broadly convex, glabrous, viscid and shining when moist, variable in color, pale red, crimson or bay red, flesh white; tubes plane or convex in the mass, depressed around the stem, their mouths small, round, pale yellow when young, becoming bright golden yellow; stem equal or slightly thickened toward the base, solid, punctate or minutely squamulose with red or pallid points, pallid or tinged with red; spores oblong fusiform, .0005-.0007 of an inch long, .0002-.00024 broad.

The red dotted boletus is a very variable species. The cap is strongly or slightly convex, smooth and shining, viscid when moist and covered with a thin tenacious pellicle which can be torn away like the skin from an overripe peach. In the young plant the thin margin sometimes extends a little beyond the mass of tubes. In color the cap may be pale red, bright red or crimson, reddish brown or chestnut color. The flesh is whitish, sometimes tinged with yellow. The tubes are plane or convex in the mass, depressed around the stem, pale yellow when young, becoming bright golden yellow with age. Their mouths are small and round. The stem is rather long and slender for the size of the cap, solid, equal in diameter in all its parts or sometimes slightly thicker at the base. It is marked with numerous small dots or points of a red, brownish or pallid color which at first sight suggests a similarity to the stem of a small specimen of Boletus scaber. The color of the stem may be whitish, pallid or reddish. The species is related to Boletus inflexus Pk. but it differs from it in having its tubes depressed about the stem, in its tube mouths being destitute of red granules and in its larger spores.

The cap is 1-2.5 inches broad; the stem is 1-3 inches long, 2-4 lines thick. It occurs in thin woods in July and August.

### **Boletus nobilis** Pk. n. sp.

NOBLE BOLETUS

PLATE 91, FIG. 1-4

Pileus firm, convex, dry, glabrous, yellowish brown or reddish brown when young, becoming ochraceous or reddish ochraceous with age, flesh white, taste mild; tubes white and stuffed when young, becoming yellow or pale ochraceous with age, nearly plane in the mass, adnate or slightly depressed around the stem, the mouths small, round; stem equal or slightly thicker at the base, solid, glabrous, generally reticulated at the top, whitish or pallid; spores oblong fusiform, .0005-.0006 of an inch long, .0002-.00024 broad.

This large and fine species grows singly or in groups in thin woods and in cleared or bushy places. It belongs to the section Edules. It differs from the edible boletus, B. edulis in its tubes being less depressed around the stem and in having no green tint. From the related boletus, B. affinis, to which it is also closely allied, it is separated by its larger size, the paler color of the cap, the paler stem and its larger spores. The flesh is thin for the size of the cap and is yellowish next the tubes. The cap is 4-8 inches broad; the stem 3-6 inches long, 6-10 lines thick. It may be found in August. In preparing it for cooking the long tubes should be removed from the cap and be rejected with the stem.

### **Strobilomyces strobilaceus** (Scop.) Berk.

CONELIKE BOLETUS

PLATE 92, FIG. 1-6

Pileus fleshy, firm, subglobose, hemispheric or convex, dry, covered with a dense thick coat of blackish or blackish brown tomentum which separates into prominent tufts or scales with intervening chinks or spaces of a pale gray or smoky white color, flesh whitish, changing to reddish on exposure to the air, then to blackish, tubes rather long, depressed around the stem, plane or convex in the mass, whitish when young and fresh, becoming red where wounded and then blackish, also becoming blackish or blackish brown with age; stem equal or tapering upward, solid, often sulcate at the top, covered with a tomentum similar to that of the pileus; spores blackish brown, globose or nearly so, rough, .0004-.0005 of an inch in diameter.

This boletus has such a peculiar shaggy appearance and blackish color and is so unlike any other mushroom in our flora that it is scarcely possible to confuse it with any other. It grows in woods or their borders, generally only a few in place. The cap is usually 2-4 inches broad; the stem 2-5 inches long, 4-8 lines thick. It may be found from July to September. In preparing it for cooking use only the flesh of the caps, peeling away the tomentum from the upper surface and removing the somewhat tenacious tubes from the lower surface. It is harmless and though it may not be considered a first class mushroom for eating purposes, it is much better than none.

### **Clavaria botrytoides** Pk. n. sp.

### GRAPELIKE CLAVARIA

PLATE 93, FIG. 5-7

Stem small, short, divided near the base into branches which are repeatedly and irregularly branched, the ultimate branches short, crowded, blunt, usually terminating in two or more blunt teeth or protuberances, red or pink at the tips when young, soon fading and becoming concolorous, stem and branches solid, flesh white, taste mild; spores narrowly elliptic or oblong, rusty brown or subcinnamon, .0003-.0004 of an inch long, .00016-.0002 broad.

The grapelike clavaria is very closely related to the red tipped clavaria and probably has been confused with it. It may be separated from that species by its thinner stem, the fading or evanescent character of the color of the ultimate branchlets and by its shorter and differently colored spores. The tips of the branches in mature or old plants are whitish like the branches themselves, but often a few small branches may be found near the base of the plant which have red tips and are therefore presumably of later development. It is possible that these two clavarias have been confused in Europe for European mycologists do not agree in their description of the spore characters of the red tipped clavaria. Stevenson describes them as subhyaline, 12-15 $\mu$ long, 6 $\mu$ broad. Massee describes them as white, 8 $\mu$ long, 5 $\mu$ broad. In our plant the spores in mass have a rusty brownish or subcinnamon color when collected on white paper and they are 8-10 $\mu$ long, 4-5 $\mu$ broad.

The plants are 2-4 inches tall and 1.5-3 inches broad. They grow in thin woods on rather poor soil and may be found in August and September. The edible qualities seem to me to be similar to those of the red tipped clavaria.

### **Clavaria pistillaris** L.

LARGE CLUB CLAVARIA

PLATE 93, FIG. 1-4

Club simple, large, soft, fleshy, glabrous, clavate or oblong clavate, obtuse, solid or slightly spongy within, even or nearly so, ochraceous buff, flesh white, taste mild; spores elliptic, .0004-.0005 of an inch long, .0002-.00024 broad.

The large club clavaria is not very common and is quite variable in size and shape. It is usually 2-6 inches long and 6-12 lines thick. Sometimes the club gradually enlarges from base to top, again it is swollen at the base and at the top or it may be nearly cylindric in the lower half and gradually enlarged upward in the upper half. Large thick specimens are sometimes cracked at the top, revealing the white flesh. The color is sometimes yellowish, sometimes ochraceous buff or tan color. It is often more highly colored at the top than toward the base. The plant is generally clean and free from the attacks of insects. It usually grows in a scattered manner, only a few specimens being found in a place, but occasionally it may form tufts of two or three plants. It grows in woods and may be found from August to September. The species is easily recognized and is not likely to be mistaken for any harmful mushroom. It is similar in its texture and flavor to the umbonate clavaria, C. pistillaris umbonata.

## EXPLANATION OF PLATES

PLATE P

### **Cortinarius heliotropicus** Pk.

HELIOTROPE CORTINARIUS

1 Immature plant with unexpanded pileus
2 Immature plant with expanded pileus
3 Mature plant with unspotted pileus
4 Mature plant with spotted pileus
5 Vertical section of the upper part of an immature plant
6 Vertical section of the upper part of a mature plant
7 Four spores, x 400

### **Pholiota appendiculata** Pk.

APPENDICULATE PHOLIOTA

8 Young plant showing unbroken veil beneath the pileus
9 Young plant showing stem and pileus
10, 11 Two immature plants, one showing lamellae beneath the pileus

12, 13 Two mature plants, one showing lamellae beneath the pileus
14, 15 Vertical sections of two young plants
16 Vertical section of the upper part of a mature plant
17 Four spores, x 400

### PLATE Q

### **Lactarius brevis** Pk.

SHORT LACTARIUS

1 Young plant
2 Mature plant with convex pileus
3 Mature plant with fully expanded pileus
4 Vertical section of a plant showing the color which the flesh soon assumes on exposure to the air
5 Four spores, x 400

### **Boletus rugosiceps** Pk.

ROUGH CAP BOLETUS

6 Young plant showing small pileus and large stem
7 Immature plant showing pale yellow tubes
8 Mature plant
9 Vertical section of the upper part of a plant
10 Four spores, x 400

### PLATE R

### **Boletus atkinsoni** Pk.

ATKINSON'S BOLETUS

1 Immature plant
2 Mature plant
3 Vertical section of the upper part of an immature plant
4 Vertical section of the upper part of a mature plant
5 Four spores, x 400

### PLATE 87

### **Lepiota cepaestipes** Sow.

ONION-STEMMED LEPIOTA

1 Cluster of three young plants
2 Cluster of six plants, four of them with caps mature
3 Vertical section of the upper part of a plant
4 Transverse section of a stem
5 Four spores, x 400

### PLATE 88

### **Hygrophorus nitidus** B. & C.

SHINING HYGROPHORUS

1, 2 Two plants with moist yellow caps
3, 4 Two plants after the excess of moisture has escaped
5 Vertical section of the upper part of a plant
6 Transverse section of a stem
7 Four spores, x 400

### **Hygrophorus laurae decipiens** Pk.

DECEIVING HYGROPHORUS

8 Cluster of five plants with moist caps
9 One plant after the excess of moisture has escaped. The lower part of the stem has been removed
10 Vertical section of the upper part of a plant
11 Four spores, x 400

### PLATE 89

### **Boletus laricinus** Berk.

LARCH BOLETUS

1, 2 Two small young plants showing scales on the caps
3 One small but mature plant with no scales on the cap
4, 5 Two mature plants of usual size
6 Vertical section of the upper part of a plant
7 Four spores, x 400

### PLATE 90

### **Boletus rubropunctus** Pk.

RED DOTTED BOLETUS

1, 2 Two immature plants with red caps and reddish stems
3 An immature plant with paler cap and stem
4, 5, 6 Three mature plants
7 Vertical section of the upper part of an immature plant
8 Vertical section of the upper part of a mature plant
9 Four spores, x 400

### PLATE 91

### **Boletus nobilis** Pk.

NOBLE BOLETUS

1 An immature small plant
2 A mature plant of medium size
3 Vertical section of the upper part of a plant
4 Four spores, x 400

## PLATE 92

### **Strobilomyces strobilaceus** (Scop.) Berk.

CONELIKE BOLETUS

1 A small immature plant
2 A larger immature plant showing the whitish tube mouths
3 A mature plant of medium size
4 Vertical section of the upper part of an immature plant
5 Vertical section of the upper part of a mature plant
6 Four spores, x 400

## PLATE 93

### **Clavaria pistillaris** L.

LARGE CLUB CLAVARIA

1, 2 Two plants, one showing cracks in the apex
3 Vertical section of a plant
4 Four spores, x 400

### **Clavaria botrytoides** Pk.

GRAPELIKE CLAVARIA

5 Immature plant with tips of branchlets red
6 Mature plant with most of the tips colored like the branches
7 Four spores, x 400

# INDEX

The superior figures tell the exact place on the page in ninths; e.g. $36^3$ means page 36, beginning in the third ninth of the page, i.e. about one third of the way down.

**Agaricus** abruptibulbus, $36^2$.
  abruptus, $35^7$-$36^2$.
  chlamydopus, $36^3$.
  cothurnatus, $36^3$, $36^5$.
  halophilus, $36^3$.
  magniceps, $36^3$.
  magnificus, $36^3$, $36^6$.
  maritimus, $36^3$, $36^5$.
  micromegethus, $36^4$.
  pilosporus, $36^4$.
  praerimosus, $36^4$.
  pusillus, $36^4$, $36^6$.
  sphaerosporus, $36^4$, $36^7$.
  tabularis, $36^4$, $36^7$.
Alpine cotton grass, $38^7$.
Amanita crenulata, $19^5$.
  lignophila, $19^6$.
  magnifica, $36^6$.
  radicata, $19^8$.
Amphicarpaea monoica, $31^9$.
Anomodon attenuatus, $31^9$.
Antennaria canadensis, $36^8$.
Appendiculate pholiota, explanation of plate, $50^9$-$51^3$.
Arenaria leptoclados, $19^9$.
  serpyllifolia *var.* tenuior, $19^9$.
Arisaema stewardsoni, $20^1$.
Atkinson's boletus, explanation of plate, $51^6$.

**Beckwith** thorn, $27^1$.
Benignant thorn, $27^5$.
Blephariglottis ciliaris, $36^9$-$37^2$.
Blephilia hirsuta, $37^2$.
Boletus, Atkinson's, explanation of plate, $51^6$.
  conelike, $48^6$-$49^3$; explanation of plate, $53^1$.
Boletus, larch, ,$46^6$-$47^3$; explanation of plate, $52^5$.
  noble, $48^1$; explanation of plate, $52^9$.
  red dotted, $47^3$; explanation of plate, $52^7$.
  rough cap, explanation of plate, $51^4$.
Boletus atkinsoni, $20^2$; explanation of plate, $51^6$.
  laricinus, $20^6$, $46^6$-$47^3$; explanation of plate, $52^5$.
  nobilis, $20^7$, $48^1$; explanation of plate, $52^8$.
  rubropunctus, $47^3$; explanation of plate, $52^6$.
  rugosiceps, $20^7$-$21^2$; explanation of plate, $51^4$.
Botrychium obliquum, $37^3$.
  tenebrosum, $21^3$.
Bryum pendulum, $21^4$.
Bulrush, $34^6$.
Burnham, Stewart H., work of, $8^7$.

**Cantharellus** cinnabarinus, $37^4$.
Carex castanea, $37^8$.
  crawei, $38^3$.
  flexilis, $37^9$.
  formosa, $38^1$.
  setifolia, $38^2$.
Cercospora circumscissa, $38^3$.
Chantarelle, $37^1$.
Cherry, wild red, $42^1$.
Cladonia gracilis, $21^5$.
  verticillata, $21^4$.
Clavaria, grapelike, $49^3$; explanation of plate, $53^5$.
  large club, $50^1$; explanation of plate, $53^3$.

Clararia, botrytoides, $21^5$, $49^3$; explanation of plate, $53^5$.
  pistillaris, $50^1$; explanation of plate, $53^3$.
  xanthosperma, $21^6$.
Coccineae, $27^9$ $29^8$, $31^8$.
Cockspur thorn, $8^4$
Collybia amabilipes, $21^8$.
Conelike boletus, $48^9$-$49^3$; explanation of plate, $53^1$.
Convolvulus repens, $21^9$.
Cortinarius heliotropicus, $22^1$; explanation of plate, $50^7$.
Cotton grass, alpine $38^7$.
Crataegus, New York species, $6^9$; synopsis of sections, $29^5$; synopsis of species, $29^9$-3 .
Crataegus acclivis, $25^3$, $30^3$.
  baxteri, $24^2$, $30^7$.
  beata, $22^8$, $30^5$.
  beckwithae, $27^1$, $31^3$.
  benigna, $27^5$, $30^9$.
  coccinea rotundifolia, $8^4$.
  colorata, $26^8$, $31^8$.
  compta, $23^4$, $30^6$.
  crus-galli, $8^4$ $29^4$, $29^9$.
  cupulifera, $27^6$, $31^3$.
  delucida, $7^3$.
  deweyana, $28^2$, $31^5$.
  diffusa, $23^5$, $30^6$.
  dunbari, 2 $^3$ $31^3$.
  durobrivensis, $25^1$, $30^3$.
  ellwangeriana, $24^7$, $30^2$.
  ferentaria, $28^3$, $31^6$.
  formosa, $23^3$, $30^5$.
  fulleriana, $24^5$, $30^1$.
  gemmosa, $27^9$-$28^1$, $31^6$.
  glaucophylla, $26^2$, $30^9$.
  gravesii, $7^4$.
  holmesiana, $29^4$, $30^4$.
  hudsonica, $28^9$-$29^1$.
  laneyi, $28^6$, $31^5$.
  leiophylla, $23^2$, $30^5$.
  lennoniana, $22^9$-$23^1$, $30^5$.
  macauleyae, $27^8$, $31^4$.
  macracantha, $29^4$, $31^6$.
  maineana, $23^9$-$24^2$, $30^7$.
  matura, $29^4$, $31^2$.
  opulens, $23^7$, $30^6$.
Crataegus, ornata, $26^4$, $31^3$.
  parviflora, $25^8$, $30^8$.
  pedicellata, $25^6$, $30^8$.
  persimilis, $22^6$ $29^9$.
  pringlei, $29^4$, $30^2$.
  punctata, $8^5$, $29^4$, $29^9$.
  rubicunda, $26^5$, $31^2$.
  spissiflora, $24^8$, $30^2$.
  streeterae, $25^9$-$26^1$, $30^9$.
  succulenta, $29^4$, $31^5$.
  tatnalliana, $28^7$.
  tenuiloba, $26^7$, $31^1$.
  tomentosa, $29^4$, $31^5$.
  verecunda, $24^8$, $30^7$.
Craterellus taxophilus, $22^6$.
Crus-galli, $29^6$, $29^9$.
Cup-bearing thorn, $27^7$.
Cypripedium reginae, $38^5$.

**Dewey** thorn, $28^2$.
Dilatatae, $25^3$.
Dipsacus laciniatus, $31^6$.
Dunbar thorn, $27^4$.

**Edible** fungi, $6^5$, $44^2$-$50^6$.
Edules, $20^5$, $48^4$.
Eleocharis palustris vigens, $38^5$.
Ellwanger thorn, $24^7$
Eocronartium typhuloides, $31^8$.
Eriophorum alpinum, $38^7$.
Explanation of plates, $50^6$-53.

**Falcata** comosa, $31^9$.
  pitcheri, $31^9$.
Favolus europaeus, $32^6$.
Fern common, $40^5$.
  grape, $21^3$, $37^3$.
Flammula abrupta, $35^9$.
Fragaria americana, $38^8$.
Fries, Elias, cited, $35^8$.
Fuller thorn, $24^5$.
Fungi, edible, $6^5$, $44^2$-$50^6$.
Fungus, refrigerator, $32^1$.
Fusarium aquaeductuum, $32^1$.

**Galera** capillaripes, $32^2$.
Geranium bicknellii, $32^3$.
Grape fern, $1^3$, 3 .
Grapelike clavaria, $49^3$; explanation of plate, $53^5$.
Grass, alpine cotton, $38^7$.
Gratiola aurea, $38^9$.

Graves thorn, $7^4$.
Gray, Asa, cited, $36^9$.
Gyrostachys ochroleuca, $32^4$.

**Habenaria** ciliaris, $36^9$.
Heliotrope cortinarius, explanation of plate, $50^7$.
Hexagona alveolaris, $32^6$.
micropora, $32^5$.
Hieracium praealtum, $39^1$.
Hydnum adustum, $39^8$.
Hygrophorus, deceiving, $46^1$; explanation of plate, $52^3$.
Hygrophorus, shining, $45^8$; explanation of plate, $52^1$.
Hygrophorus laurae decipiens, $39^4$, $46^1$; explanation of plate, $52^3$.
nitidus, $45^8$; explanation of plate, $52^1$.
Hypholoma, brick-red, $39^5$.
Hypholoma rugocephalum, $32^7$.
sublateritium, $39^5$.
Hypomyces banningiae, $32^7$.
inaequalis, $32^8$.

**Inocybe** maritima, $36^5$.
Intricatae, $24^3$, $29^8$, $30^7$.

**Juniper**, $40^1$.
Juniperus nanus, $40^1$.

**Lachnocladium** semivestitum, $33^1$.
Lactarius, short, explanation of plate, $51^2$.
Lactarius brevis, $33^2$; explanation of plate, $51^2$.
colorascens, $33^5$.
Laney thorn, $28^6$.
Larch boletus, $46^6$-$47^3$; explanation of plate, $52^5$.
Lepiota onion-stemmed, $44^2$-$45^3$; explanation of plate, $51^8$.
Lepiota cepaestipes, $44^2$-$45^3$; explanation of plate, $51^8$.
naucina, $36^7$.
Limnorchis dilatata linearifolius, $40^3$.
Lobulatae, $25^3$, $25^6$, $29^7$, $30^2$.

**Macauley** thorn, $27^8$.
Marasmius resinosus candidissimus, $40^5$.
niveus, $40^4$.
Massee, cited, $49^8$.
Molles, $24^5$, $29^7$, $30^1$.
Moss, living, $31^8$.
Mushrooms, edible, species sent to St Louis Exposition, $8^7$.
Myxacium, $22^4$.

**Onion**-stemmed lepiota, $44^2$-$45^3$; explanation of plate, $51^8$.
Osmunda claytoniana, $40^5$.
Oxalis cymosa, $40^7$.

**Phacelia** dubia, $40^9$.
Pholiota appendiculata, $33^8$-$34^3$; explanation of plate, $50^9$-$51^2$.
Picea canadensis, $41^1$.
Pitcher plant, $42^9$-$43^4$.
Plants, contributors, list of, $5^7$, $12^5$-$19^4$; species added to collection, $5^5$, $9^1$-$12^4$; species not before reported, $6^1$, $19^5$-$35^6$.
Plates, explanation of, $50^6$-53.
Plum, wild, $41^9$.
Pruinosae, $8^2$, $22^9$, $29^7$, $30^4$.
Prunus americana, $41^9$.
pennsylvanica, $42^1$.
Pterospora andromedea, $42^2$.
Punctatae, $29^6$, $29^9$.

**Refrigerator** fungus, $32^1$.
Rochester thorn, $25^3$.
Rosa sayi, $42^4$.
Rudbeckia hirta, $42^4$.
laciniata, $42^5$.

**St Louis** Exposition, botanical exhibit, $8^7$.
Salix amygdaloides, $42^7$.
cordata, $42^8$.
lucida, $34^4$.
nigra, $42^8$.
serissima, $34^4$.
Sargent, cited, $25^3$.
Sarracenia purpurea, $42^9$-$43^4$.
Scirpus lacustris, $34^6$.
occidentalis, $34^6$.
Sedges, $37^9$, $38^2$.
Silene vulgaris, $43^4$.
Sisyrinchium arenicola, $34^7$.
Solomon's seal, star-flowered, $43^6$.
Spruce, white, $41^1$.
Stachys sieboldi, $34^8$.

Stereum spadiceum, $43^5$.
Stevenson, cited, $49^8$.
Strawberry, $38^8$.
Strobilomyces strobilaceus, $48^6$-$49^3$;
  explanation of plate, $53^1$.
Stropharia cothurnata, $36^5$.

**Tenuifoliae**, $8^2$, $25^8$, $29^8$, $30^8$-$31^3$.
Teucrium boreale, $34^8$.
Thorn, Beckwith, $27^1$.
  benignant, $27^5$.
  cockspur, $8^4$.
  cup-bearing, $27^7$.
  Dewey, $28^3$.
  dotted fruited, $8^5$.
  Dunbar, $27^4$.
  Ellwanger, $24^7$.
  Fuller, $24^5$.
  Graves, $7^4$.
  Laney, $28^6$.
  light armed, $28^4$.
  Macauley, $27^8$.
  Rochester, $25^3$.
  round leaved, $8^4$.
  thin lobed, $26^7$.
Tomentosae, $28^7$, $29^5$, $31^4$.
Tricholoma grammopodium, $36^7$.

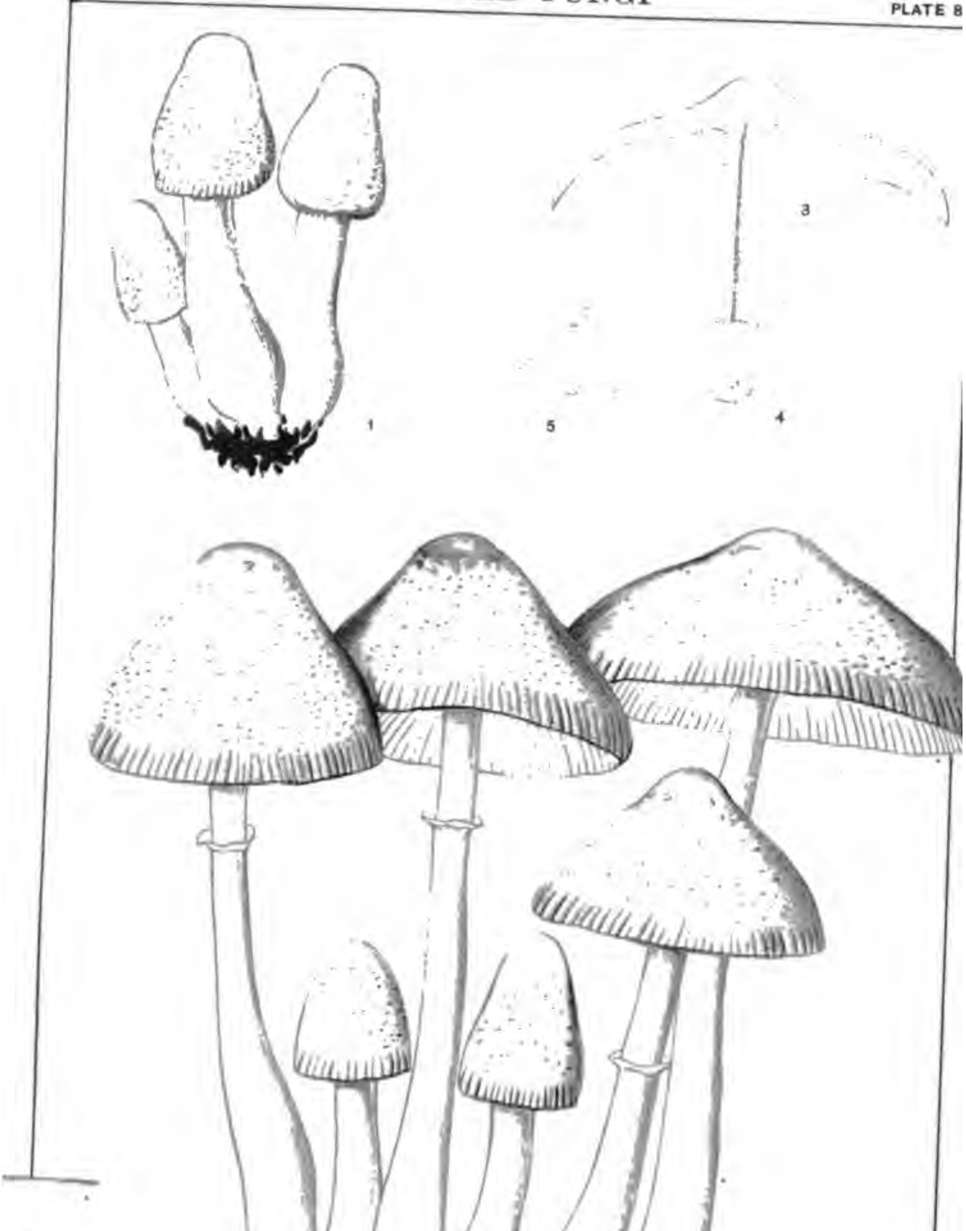
**Uredinopsis** atkinsonii, $34^9$.
  osmundae, $35^1$.

**Vagnera** stellata, $43^6$.
Viburnum lentago, $43^7$.
Viola amoena, $35^2$.
  blanda, $35^2$.
  latiuscula, $35^3$.
  palmata dilatata, $43^9$.
  papilionacea domestica, $44^1$.
  septentrionalis, $35^4$.
Violets, $35^3$.
  northern blue, $35^4$.
Volvaria parvula, $36^6$.

**Willows**, $34^4$, $42^8$.

**Xyris** flexuosa, $35^6$.
  montana, $35^5$.

**Zygodesmus** granulosus, $35^7$.



LEPIOTA CEPAESTIPES Sow.

ONION-STEMMED LEPIOTA

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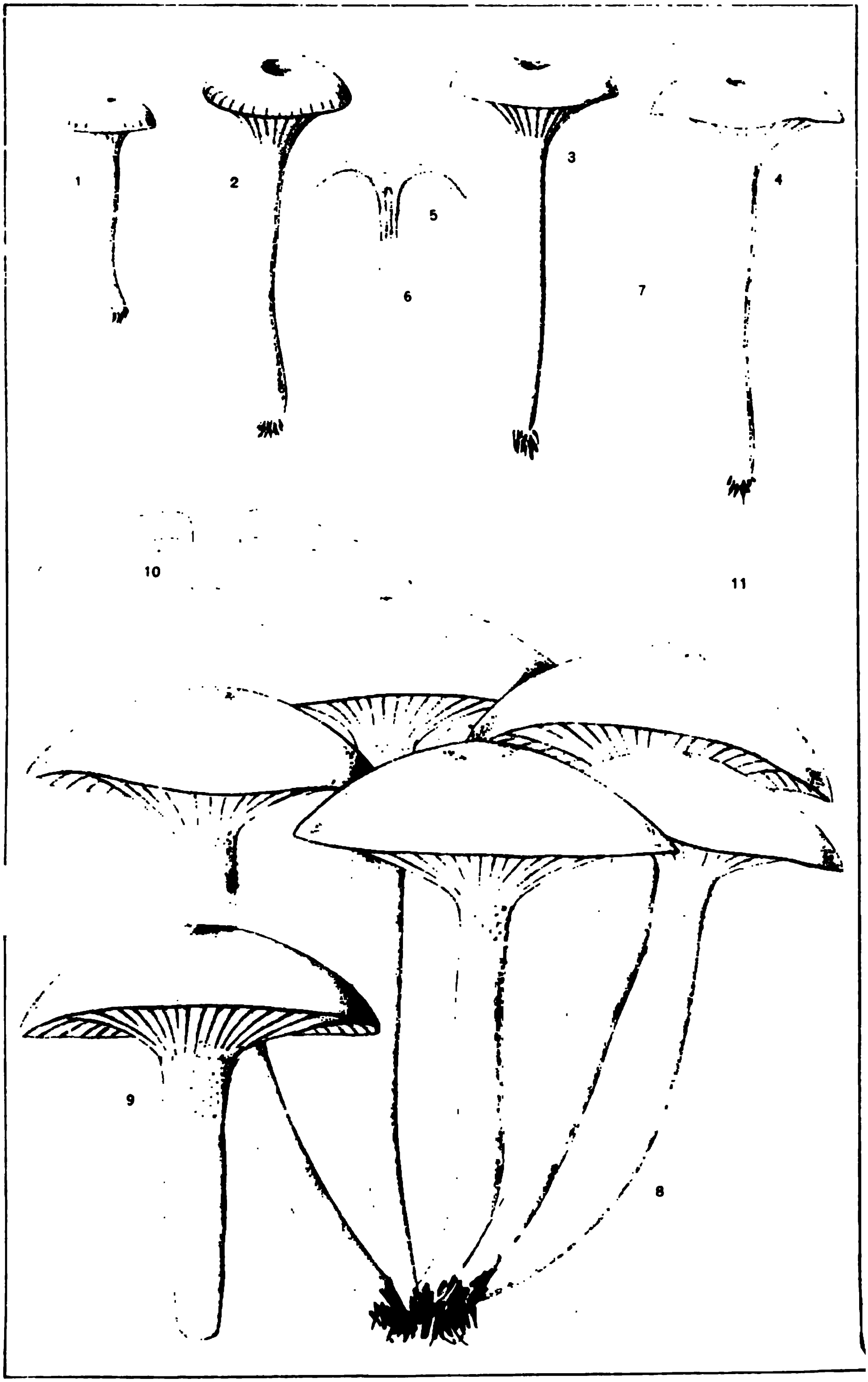

FIG. 1-7 HYGROPHORUS *NITIDUS* B.&C. FIG. 8-11 H. LAURAE DECIPIENS

*SHINING HYGROPHORUS* DECEIVING HYGROPHOR

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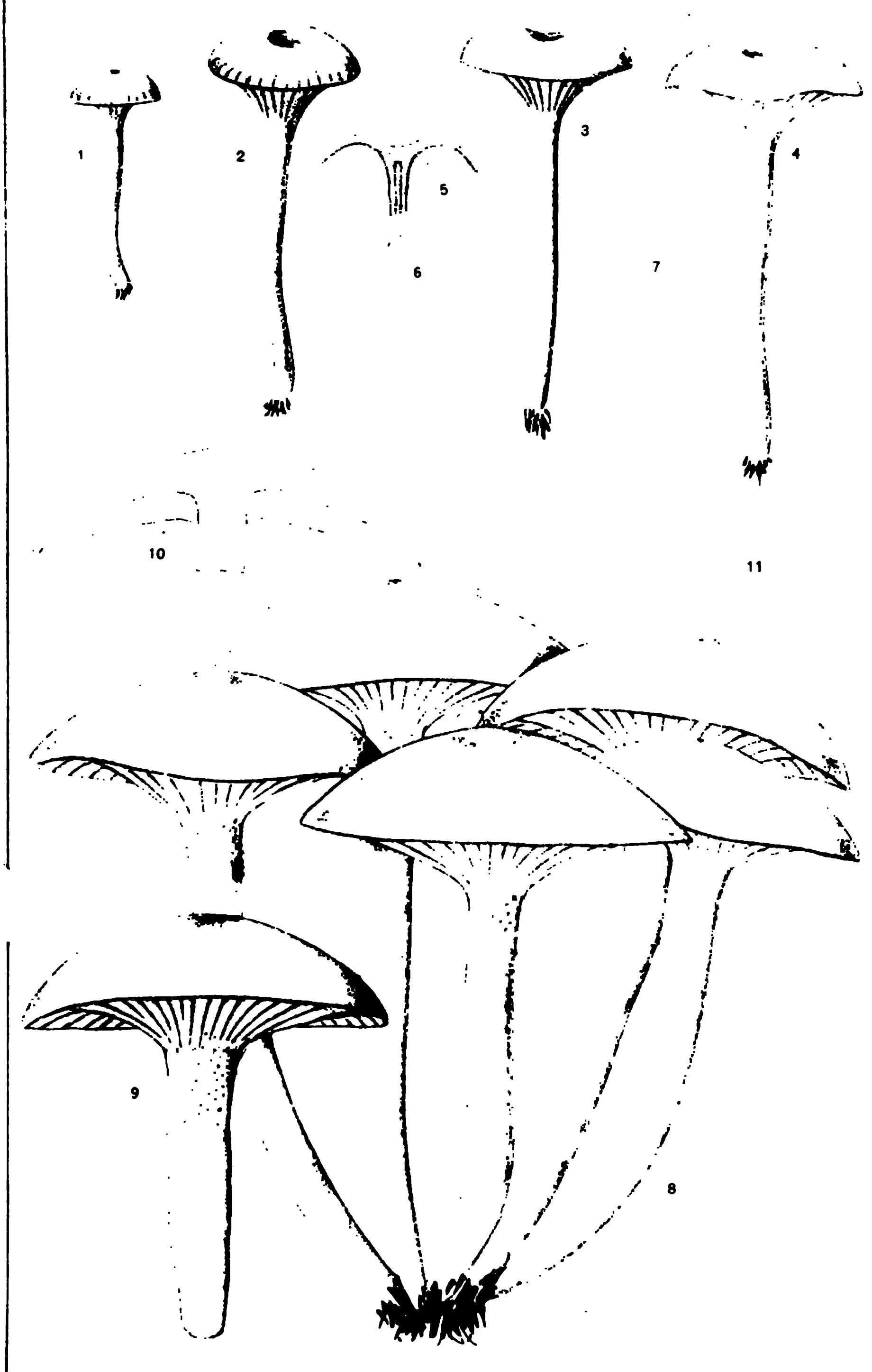

FIG. 1-7 HYGROPHORUS *NITIDUS* B.& C. FIG. 8-11 H. LAURAE DECIPIENS

*SHINING HYGROPHORUS* DECEIVING HYGROPHOR

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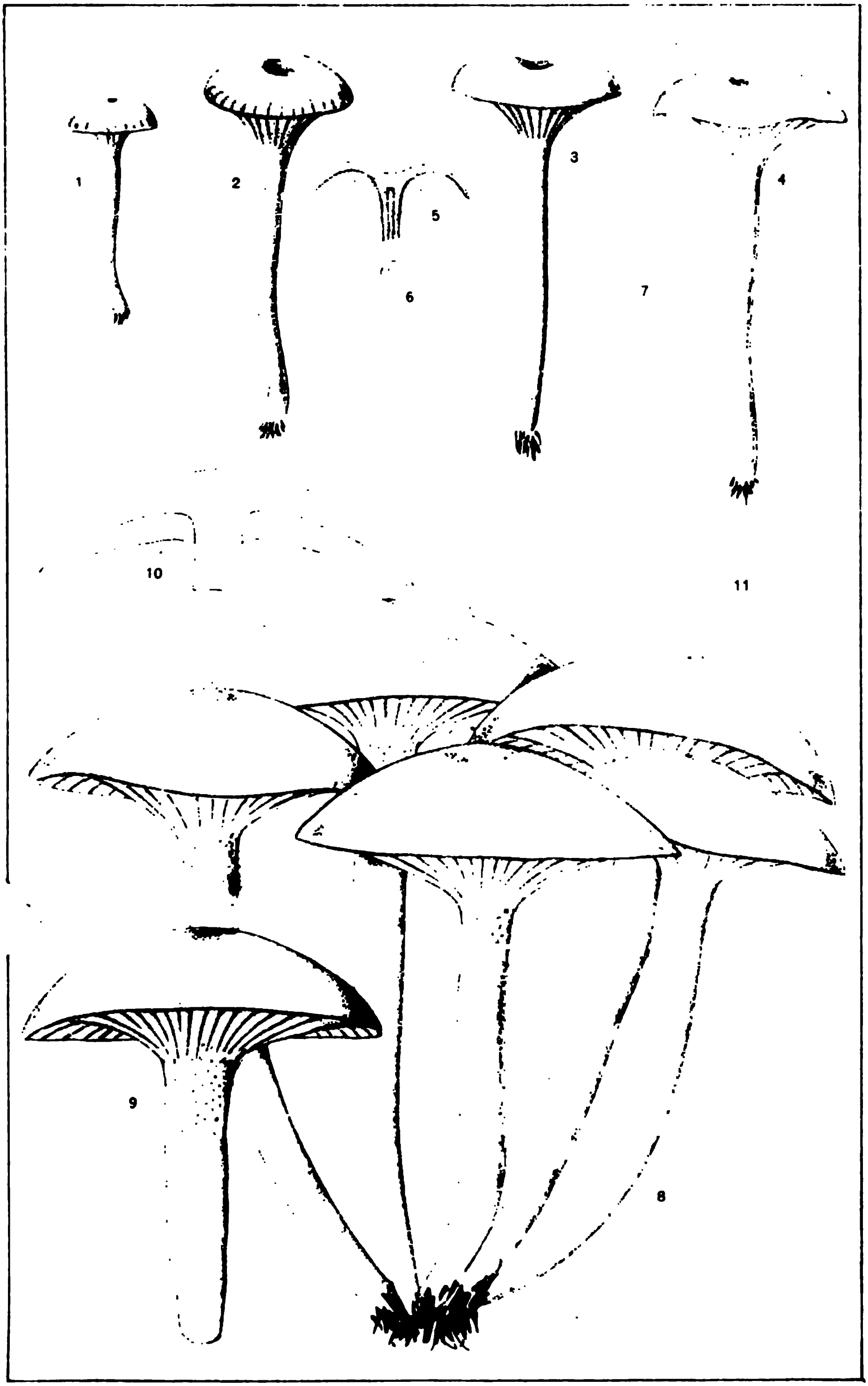

Fig. 1-7 HYGROPHORUS *NITIDUS* B.& C. Fig. 8-11 H. LAURAE DECIPIENS

*SHINING HYGROPHORUS* DECEIVING HYGROPHOR

# INDEX

The superior figures tell the exact place on the page in ninths; e.g. $36^{3}$ means page 36, beginning in the third ninth of the page, i.e. about one third of the way down.

**Agaricus** abruptibulbus, $36^{2}$.
  abruptus, $35^{7}$-$36^{2}$.
  chlamydopus, $36^{2}$.
  cothurnatus, $36^{2}$, $36^{5}$.
  halophilus, $36^{3}$.
  magniceps, $36^{3}$.
  magnificus, $36^{3}$, $36^{6}$.
  maritimus, $36^{3}$, $36^{5}$.
  micromegethus, $36^{4}$.
  pilosporus, $36^{4}$.
  praerimosus, $36^{4}$.
  pusillus, $36^{4}$, $36^{6}$.
  sphaerosporus, $36^{4}$, $36^{7}$.
  tabularis, $36^{4}$, $36^{7}$.
Alpine cotton grass, $38^{7}$.
Amanita crenulata, $19^{5}$.
  lignophila, $19^{6}$.
  magnifica, $36^{6}$.
  radicata, $19^{8}$.
Amphicarpaea monoica, $31^{9}$.
Anomodon attenuatus, $31^{9}$.
Antennaria canadensis, $36^{8}$.
Appendiculate pholiota, explanation of plate, $50^{9}$-$51^{2}$.
Arenaria leptoclados, $19^{9}$.
  serpyllifolia *var.* tenuior, $19^{9}$.
Arisaema stewardsoni, $20^{1}$.
Atkinson's boletus, explanation of plate, $51^{6}$.

**Beckwith** thorn, $27^{1}$.
Benignant thorn, $27^{5}$.
Blephariglottis ciliaris, $36^{9}$-$37^{2}$.
Blephilia hirsuta, $37^{2}$.
Boletus, Atkinson's, explanation of plate, $51^{6}$.
  conelike, $48^{8}$-$49^{2}$; explanation of plate, $53^{1}$.
Boletus, larch, ,$46^{6}$-$47^{3}$; explanation of plate, $52^{5}$.
  noble, $48^{1}$; explanation of plate, $52^{9}$.
  red dotted, $47^{2}$; explanation of plate, $52^{7}$.
  rough cap, explanation of plate, $51^{4}$.
Boletus atkinsoni, $20^{2}$; explanation of plate, $51^{6}$.
  laricinus, $20^{6}$, $46^{6}$-$47^{3}$; explanation of plate, $52^{5}$.
  nobilis, $20^{7}$, $48^{1}$; explanation of plate, $52^{8}$.
  rubropunctus, $47^{2}$; explanation of plate, $52^{6}$.
  rugosiceps, $20^{7}$-$21^{2}$; explanation of plate, $51^{4}$.
Botrychium obliquum, $37^{2}$.
  tenebrosum, $21^{3}$.
Bryum pendulum, $21^{4}$.
Bulrush, $34^{6}$.
Burnham, Stewart H., work of, $8^{7}$.

**Cantharellus** cinnabarinus, $37^{4}$.
Carex castanea, $37^{8}$.
  crawei, $38^{3}$.
  flexilis, $37^{9}$.
  formosa, $38^{1}$.
  setifolia, $38^{2}$.
Cercospora circumscissa, $38^{3}$.
Chantarelle, $37^{4}$.
Cherry, wild red, $42^{1}$.
Cladonia gracilis, $21^{5}$.
  verticillata, $21^{4}$.
Clavaria, grapelike, $49^{3}$; explanation of plate, $53^{5}$.
  large club, $50^{1}$; explanation of plate, $53^{3}$.

**Clararia**, botrytoides, $21^5$, $49^3$; explanation of plate, $53^5$.
pistillaris, $50^1$; explanation of plate, $53^8$.
xanthosperma $21^6$.
Coccineae, $27^9$ $29^8$, $31^8$.
Cockspur thorn, $8^4$.
Collybia amabilipes, $21^8$.
Conelike boletus, $48^6$-$49^3$; explanation of plate, $53^1$.
Convolvulus repens, $21^9$.
Cortinarius heliotropicus, $22^1$; explanation of plate $50^7$.
Cotton grass, alpine, $38^7$.
Crataegus, New York species, $6^6$; synopsis of sections, $29^5$; synopsis of species, $29^6$-$31^8$.
Crataegus acclivis, $25^3$, $30^3$.
baxteri, $24^2$, $30^7$.
beata, $22^8$, $30^5$.
beckwithae, $27^1$, $31^3$.
benigna, $27^5$, $30^9$.
coccinea rotundifolia, $8^4$.
colorata, $26^8$, $31^3$.
compta, $23^4$, $30^6$.
crus-galli, $8^4$, $29^4$, $29^9$.
cupulifera, $27^6$, $31^3$.
delucida, $7^3$.
deweyana, $28^2$, $31^5$.
diffusa, $23^5$, $30^6$.
dunbari, $27^3$, $31^3$.
durobrivensis, $25^1$, $30^3$.
ellwangeriana, $24^7$, $30^2$.
ferentaria, $28^3$, $31^6$.
formosa, $23^3$, $30^5$.
fulleriana, $24^5$, $30^1$.
gemmosa, $27^9$-$28^1$, $31^6$.
glaucophylla, $26^2$, $30^9$.
gravesii, $7^4$.
holmesiana, $29^4$, $30^4$.
hudsonica, $28^9$-$29^1$.
laneyi, $28^6$, $31^5$.
leiophylla, $23^2$, $30^5$.
lennoniana, $22^9$-$23^1$, $30^5$.
macauleyae, $27^8$, $31^4$.
macracantha, $29^4$, $31^6$.
maineana, $23^9$-$24^2$, $30^7$.
matura, $29^4$, $31^2$.
opulens, $23^7$, $30^6$.
Crataegus, ornata, $26^4$, $31^2$.
parviflora, $25^8$, $30^8$.
pedicellata, $25^6$, $30^8$.
persimilis $22^6$ $9^9$.
pringlei, $29^4$ $30^2$.
punctata, $8^5$, $29^4$, $29^9$.
rubicunda, $26^5$, $31^2$.
spissiflora, $24^8$, $30^2$.
streeterae, $25^9$-$26^1$, $30^9$.
succulenta, $29^4$, $31^5$.
tatnalliana, $28^7$.
tenuiloba, $26^7$, $31^1$.
tomentosa, $29^4$, $31^5$.
verecunda, $24^3$, $30^7$.
Craterellus taxophilus, $22^6$.
Crus-galli, $29^6$, $29^9$.
Cup-bearing thorn, $27^7$.
Cypripedium reginae, $38^5$.

**Dewey** thorn, $28^2$.
Dilatatae, $25^8$.
Dipsacus laciniatus, $31^6$.
Dunbar thorn, $27^4$.

**Edible** fungi, $6^5$, $44^2$-$50^6$.
Edules, $20^5$, $48^4$.
Eleocharis palustris vigens, $38^5$.
Ellwanger thorn, $24^7$.
Eocronartium typhuloides, $31^8$.
Eriophorum alpinum, $38^7$.
Explanation of plates, $50^6$-53.

**Falcata** comosa, $31^9$.
pitcheri, $31^9$
Favolus europaeus, $32^6$.
Fern common, $40^5$.
grape, $21^3$, $37^3$.
Flammula abrupta, $35^9$.
Fragaria americana, $38^8$.
Fries, Elias, cited, $35^8$.
Fuller thorn, $24^5$.
Fungi, edible, $6^5$, $44^2$-$50^6$.
Fungus, refrigerator, $32^1$.
Fusarium aquaeductuum, $32^1$.

**Galera** capillaripes, $32^2$.
Geranium bicknellii, $32^3$.
Grape fern, $21^3$, $37^3$.
Grapelike clavaria, $49^3$; explanation of plate, $53^5$.
Grass, alpine cotton, $38^7$.
Gratiola aurea, $38^9$.

Graves thorn, $7^4$.
Gray, Asa, cited, $36^9$.
Gyrostachys ochroleuca, $32^4$.

**Habenaria** ciliaris, $36^9$.
Heliotrope cortinarius, explanation of plate, $50^7$.
Hexagona alveolaris, $32^6$.
  micropora, $32^5$.
Hieracium praealtum, $39^1$.
Hydnum adustum, $39^3$.
Hygrophorus, deceiving, $46^1$; explanation of plate, $52^3$.
Hygrophorus, shining, $45^3$; explanation of plate, $52^1$.
Hygrophorus laurae decipiens, $39^4$, $46^1$; explanation of plate, $52^3$.
  nitidus, $45^3$; explanation of plate, $52^1$.
Hypholoma, brick-red, $39^5$.
Hypholoma rugocephalum, $32^7$.
  sublateritium, $39^5$.
Hypomyces banningiae, $32^7$.
  inaequalis, $32^8$.

**Inocybe** maritima, $36^5$.
Intricatae, $24^3$, $29^8$, $30^7$.

**Juniper**, $40^1$.
Juniperus nanus, $40^1$.

**Lachnocladium** semivestitum, $33^1$.
Lactarius, short, explanation of plate, $51^2$.
Lactarius brevis, $33^2$; explanation of plate, $51^2$.
  colorascens, $33^5$.
Laney thorn, $28^6$.
Larch boletus, $46^6$-$47^3$; explanation of plate, $52^5$.
Lepiota onion-stemmed, $44^2$-$45^3$; explanation of plate, $51^8$.
Lepiota cepaestipes, $44^2$-$45^3$; explanation of plate, $51^8$.
  naucina, $36^7$.
Limnorchis dilatata linearifolius, $40^3$.
Lobulatae, $25^3$, $25^6$, $29^7$, $30^2$.

**Macauley** thorn, $27^8$.
Marasmius resinosus candidissimus, $40^5$.
  niveus, $40^4$.
Massee, cited, $49^8$.
Molles, $24^5$, $29^7$, $30^1$.
Moss, living, $31^8$.
Mushrooms, edible, species sent to St Louis Exposition, $8^7$.
Myxacium, $22^4$.

**Onion**-stemmed lepiota, $44^2$-$45^3$; explanation of plate, $51^8$.
Osmunda claytoniana, $40^5$.
Oxalis cymosa, $40^7$.

**Phacelia** dubia, $40^9$.
Pholiota appendiculata, $33^8$-$34^3$; explanation of plate, $50^9$-$51^2$.
Picea canadensis, $41^1$.
Pitcher plant, $42^9$-$43^4$.
Plants, contributors, list of, $5^7$, $12^5$-$19^4$; species added to collection, $5^5$, $9^1$-$12^4$; species not before reported, $6^1$, $19^5$-$35^6$.
Plates, explanation of, $50^6$-53.
Plum, wild, $41^9$.
Pruinosae, $8^2$, $22^9$, $29^7$, $30^4$.
Prunus americana, $41^9$.
  pennsylvanica, $42^1$.
Pterospora andromedea, $42^3$.
Punctatae, $29^6$, $29^9$.

**Refrigerator** fungus, $32^1$.
Rochester thorn, $25^2$.
Rosa sayi, $42^4$.
Rudbeckia hirta, $42^4$.
  laciniata, $42^5$.

**St Louis** Exposition, botanical exhibit, $8^7$.
Salix amygdaloides, $42^7$.
  cordata, $42^8$.
  lucida, $34^4$.
  nigra, $42^9$.
  serissima, $34^4$.
Sargent, cited, $25^3$.
Sarracenia purpurea, $42^9$-$43^4$.
Scirpus lacustris, $34^6$.
  occidentalis, $34^6$.
Sedges, $37^9$, $38^2$.
Silene vulgaris, $43^4$.
Sisyrinchium arenicola, $34^7$.
Solomon's seal, star-flowered, $43^6$.
Spruce, white, $41^1$.
Stachys sieboldi, $34^8$.

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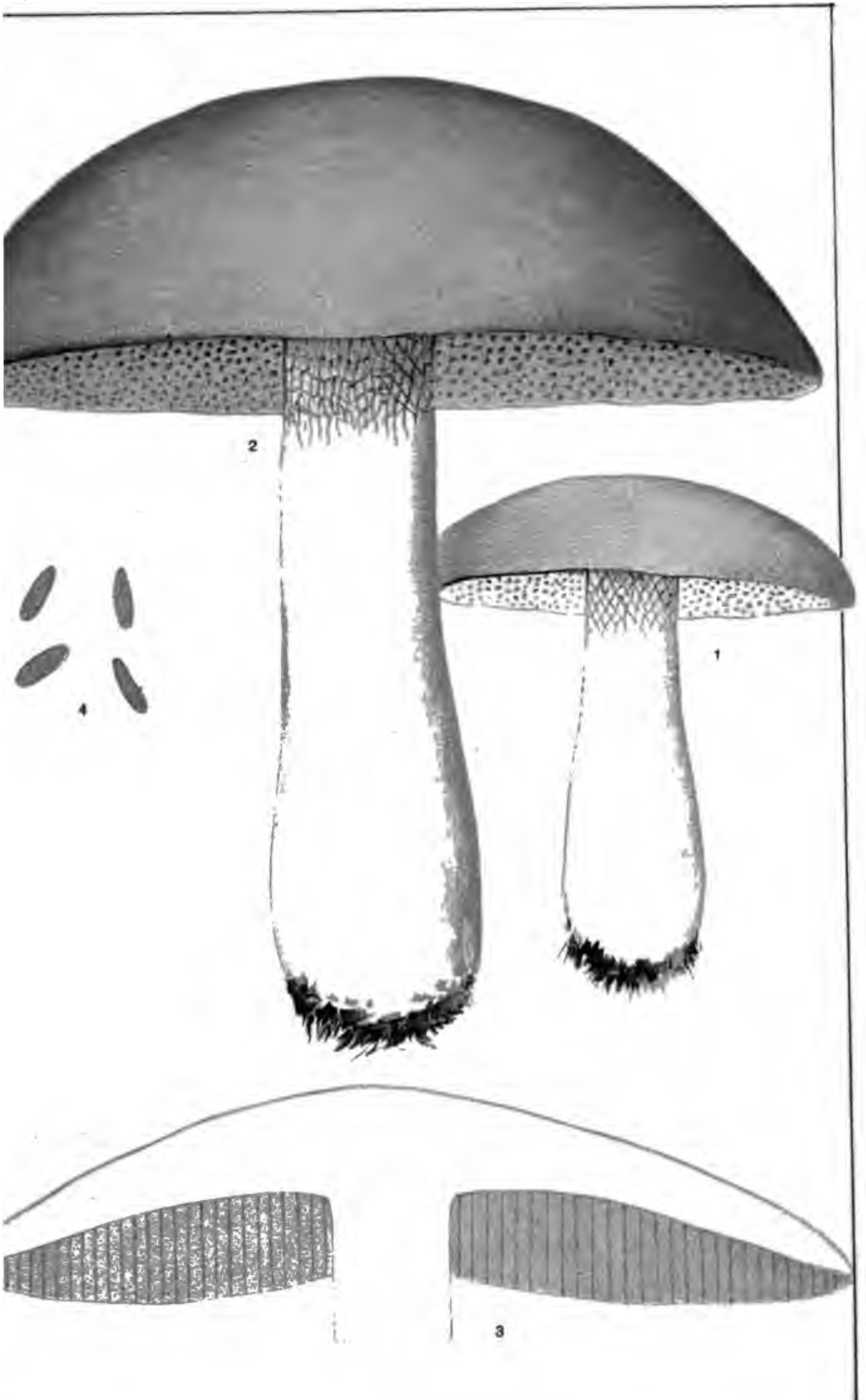

*BOLETUS* NOBILIS PK.
NOBLE BOLETUS

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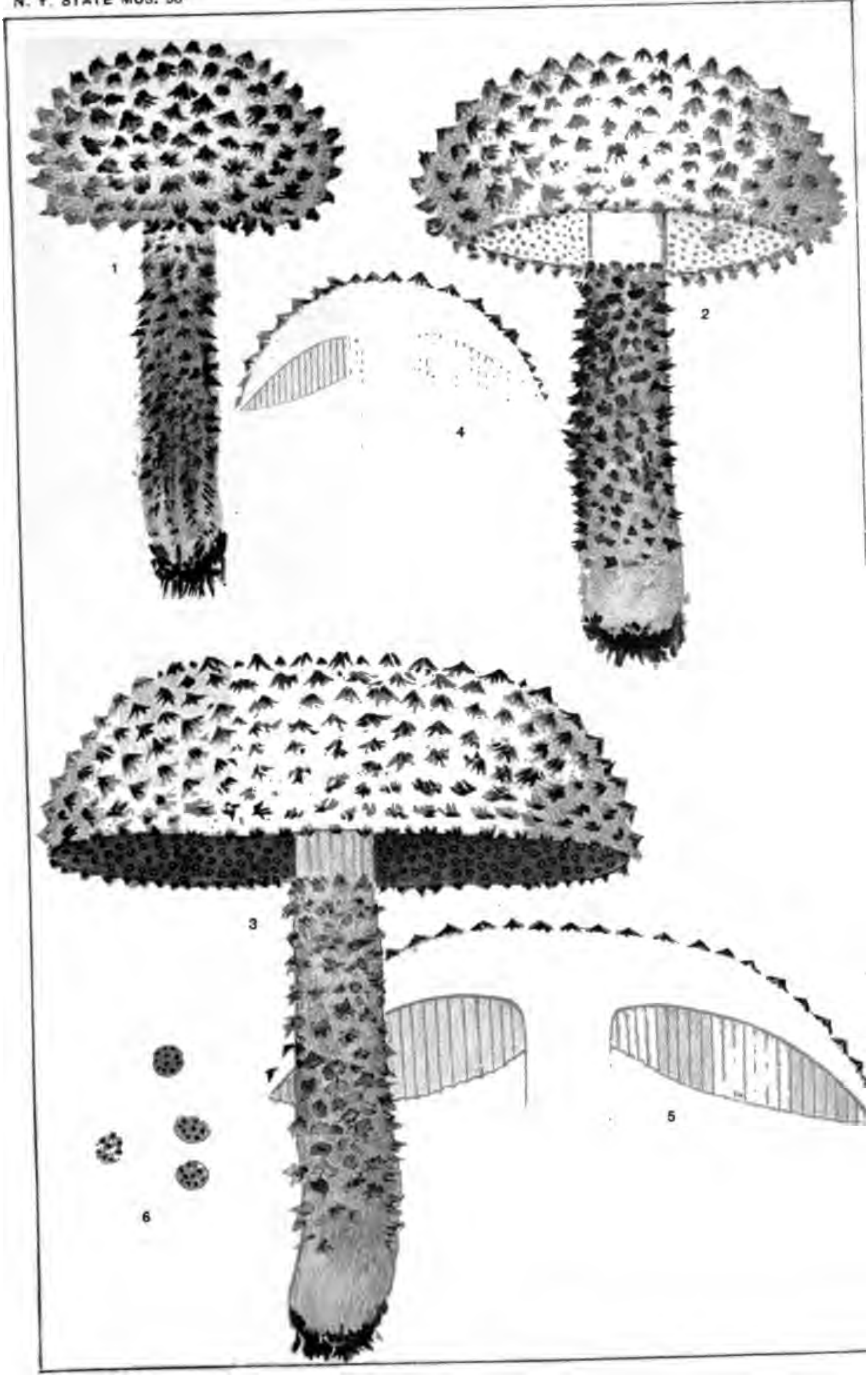
EDIBLE FUNGI



*STROBILOMYCES* STROBILACEUS (SCOP.) BERK.
CONE-LIKE BOLETUS

**Clararia**, botrytoides, $21^5$, $49^8$; explanation of plate, $53^5$.
  pistillaris, $50^1$; explanation of plate, $53^3$.
  xanthosperma, $21^6$.
Coccineae, $27^9$, $29^8$, $31^3$.
Cockspur thorn, $8^4$.
Collybia amabilipes, $21^8$.
Conelike boletus, $48^6$-$49^3$; explanation of plate, $53^1$.
Convolvulus repens, $21^9$.
Cortinarius heliotropicus, $22^1$; explanation of plate, $50^7$.
Cotton grass, alpine, $38^7$.
Crataegus, New York species, $6^6$; synopsis of sections, $29^5$; synopsis of species, $29^9$-$31^6$.
Crataegus acclivis, $25^3$, $30^3$.
  baxteri, $24^2$, $30^7$.
  beata, $22^8$, $30^5$.
  beckwithae, $27^1$, $31^3$.
  benigna, $27^5$, $30^9$.
  coccinea rotundifolia, $8^4$.
  colorata, $26^8$, $31^3$.
  compta, $23^4$, $30^6$.
  crus-galli, $8^4$, $29^4$, $29^9$.
  cupulifera, $27^6$, $31^3$.
  delucida, $7^3$.
  deweyana, $28^2$, $31^5$.
  diffusa, $23^5$, $30^6$.
  dunbari, $27^3$, $31^3$.
  durobrivensis, $25^1$, $30^3$.
  ellwangeriana, $24^7$, $30^2$.
  ferentaria, $28^3$, $31^6$.
  formosa, $23^3$, $30^5$.
  fulleriana, $24^5$, $30^1$.
  gemmosa, $27^9$-$28^1$, $31^6$.
  glaucophylla, $26^2$, $30^9$.
  gravesii, $7^4$.
  holmesiana, $29^4$, $30^4$.
  hudsonica, $28^9$-$29^1$.
  laneyi, $28^6$, $31^5$.
  leiophylla, $23^2$, $30^5$.
  lennoniana, $22^9$-$23^1$, $30^5$.
  macauleyae, $27^8$, $31^4$.
  macracantha, $29^4$, $31^6$.
  maineana, $23^9$-$24^2$, $30^7$.
  matura, $29^4$, $31^2$.
  opulens, $23^7$, $30^6$.
Crataegus, ornata, $26^4$, $31^2$.
  parviflora, $25^8$, $30^8$.
  pedicellata, $25^6$, $30^3$.
  persimilis, $22^6$, $29^9$.
  pringlei, $29^4$, $30^2$.
  punctata, $8^5$, $29^4$, $29^9$.
  rubicunda, $26^5$, $31^2$.
  spissiflora, $24^8$, $30^2$.
  streeterae, $25^9$-$26^1$, $30^9$.
  succulenta, $29^4$, $31^5$.
  tatnalliana, $28^7$.
  tenuiloba, $26^7$, $31^1$.
  tomentosa, $29^4$, $31^5$.
  verecunda, $24^3$, $30^7$.
Craterellus taxophilus, $22^6$.
Crus-galli, $29^6$, $29^9$.
Cup-bearing thorn, $27^7$.
Cypripedium reginae, $38^5$.

**Dewey** thorn, $28^2$.
Dilatatae, $25^3$.
Dipsacus laciniatus, $31^6$.
Dunbar thorn, $27^4$.

**Edible** fungi, $6^5$, $44^2$-$50^6$.
Edules, $20^5$, $48^4$.
Eleocharis palustris vigens, $38^5$.
Ellwanger thorn, $24^7$.
Eocronartium typhuloides, $31^8$.
Eriophorum alpinum, $38^7$.
Explanation of plates, $50^6$-53.

**Falcata** comosa, $31^9$.
  pitcheri, $31^9$.
Favolus europaeus, $32^6$.
Fern, common, $40^5$.
  grape, $21^3$, $37^3$.
Flammula abrupta, $35^9$.
Fragaria americana, $38^8$.
Fries, Elias, cited, $35^8$.
Fuller thorn, $24^5$.
Fungi, edible, $6^5$, $44^2$-$50^6$.
Fungus, refrigerator, $32^1$.
Fusarium aquaeductuum, $32^1$.

**Galera** capillaripes, $32^3$.
Geranium bicknellii, $32^8$.
Grape fern, $21^3$, $37^3$.
Grapelike clavaria, 49; explanation of plate, $53^5$.
Grass, alpine cotton, $38^7$.
Gratiola aurea, $38^9$.

**Graves** thorn, 7$^4$.
**Gray, Asa**, cited, 36$^9$.
**Gyrostachys** ochroleuca, 32$^4$.

**Habenaria** ciliaris, 36$^9$.
**Heliotrope** cortinarius, explanation of plate, 50$^7$.
**Hexagona** alveolaris, 32$^6$.
  micropora, 32$^5$.
**Hieracium** praealtum, 39$^1$.
**Hydnum** adustum, 39$^3$.
**Hygrophorus**, deceiving, 46$^1$; explanation of plate, 52$^3$.
**Hygrophorus**, shining, 45$^3$; explanation of plate, 52$^1$.
**Hygrophorus** laurae decipiens, 39$^4$, 46$^1$; explanation of plate, 52$^3$.
  **nitidus**, 45$^3$; explanation of plate, 52$^1$.
**Hypholoma**, brick-red, 39$^5$.
**Hypholoma** rugocephalum, 32$^7$.
  **sublateritium**, 39$^5$.
**Hypomyces** banningiae, 32$^7$.
  **inaequalis**, 32$^8$.

**Inocybe** maritima, 36$^5$.
**Intricatae**, 24$^3$, 29$^8$, 30$^7$.

**Juniper**, 40$^1$.
**Juniperus** nanus, 40$^1$.

**Lachnocladium** semivestitum, 33$^1$.
**Lactarius**, short, explanation of plate, 51$^2$.
**Lactarius** brevis, 33$^2$; explanation of plate, 51$^2$.
  **colorascens**, 33$^5$.
**Laney thorn**, 28$^6$.
**Larch boletus**, 46$^6$-47$^3$; explanation of plate, 52$^5$.
**Lepiota** onion-stemmed, 44$^2$-45$^3$; explanation of plate, 51$^8$.
**Lepiota** cepaestipes, 44$^2$-45$^3$; explanation of plate, 51$^8$.
  **naucina**, 36$^7$.
**Limnorchis** dilatata linearifolius, 40$^3$.
**Lobulatae**, 25$^3$, 25$^6$, 29$^7$, 30$^3$.

**Macauley** thorn, 27$^5$.
**Marasmius** resinosus candidissimus, 40$^5$.
  **niveus**, 40$^4$.
Massee, cited, 49$^8$.
Molles, 24$^5$, 29$^7$, 30$^1$.
Moss, living, 31$^8$.
Mushrooms, edible, species sent to St Louis Exposition, 8$^7$.
Myxacium, 22$^4$.

**Onion**-stemmed lepiota, 44$^2$-45$^3$; explanation of plate, 51$^8$.
Osmunda claytoniana, 40$^5$.
Oxalis cymosa, 40$^7$.

**Phacelia** dubia, 40$^9$.
Pholiota appendiculata, 33$^8$-34$^3$; explanation of plate, 50$^9$-51$^2$.
Picea canadensis, 41$^1$.
Pitcher plant, 42$^9$-43$^4$.
Plants, contributors, list of, 5$^7$, 12$^5$-19$^4$; species added to collection, 5$^5$, 9$^1$-12$^4$; species not before reported, 6$^1$, 19$^5$-35$^6$.
Plates, explanation of, 50$^6$-53.
Plum, wild, 41$^9$.
Pruinosae, 8$^2$, 22$^9$, 29$^7$, 30$^4$.
Prunus americana, 41$^9$.
  pennsylvanica, 42$^1$.
Pterospora andromedea, 42$^2$.
Punctatae, 29$^6$, 29$^9$.

**Refrigerator** fungus, 32$^1$.
Rochester thorn, 25$^2$.
Rosa sayi, 42$^4$.
Rudbeckia hirta, 42$^4$.
  laciniata, 42$^5$.

**St Louis** Exposition, botanical exhibit, 8$^7$.
Salix amygdaloides, 42$^7$.
  cordata, 42$^8$.
  lucida, 34$^4$.
  nigra, 42$^8$.
  serissima, 34$^4$.
Sargent, cited, 25$^3$.
Sarracenia purpurea, 42$^9$-43$^4$.
Scirpus lacustris, 34$^6$.
  occidentalis, 34$^6$.
Sedges, 37$^9$, 38$^2$.
Silene vulgaris, 43$^4$.
Sisyrinchium arenicola, 34$^7$.
Solomon's seal, star-flowered, 43$^6$.
[illegible]
[illegible]

Stereum spadiceum, $43^5$.
Stevenson, cited, $49^8$.
Strawberry, $38^8$.
Strobilomyces strobilaceus, $48^6$-$49^3$;
explanation of plate, $53^1$.
Stropharia cothurnata, $36^5$.

**Tenuifoliae**, $8^2$, $25^8$, $29^8$, $30^8$-$31^3$.
Teucrium boreale, $34^8$.
Thorn, Beckwith, $27^1$.
benignant, $27^5$.
cockspur, $8^4$.
cup-bearing, $27^7$.
Dewey, $28^2$.
dotted fruited, $8^5$.
Dunbar, $27^4$.
Ellwanger, $24^7$.
Fuller, $24^5$.
Graves, $7^4$.
Laney, $28^6$.
light armed, $28^4$.
Macauley, $27^8$.
Rochester, $25^2$.
round leaved, $8^4$.
thin lobed, $26^7$.
Tomentosae, $28^7$, $29^5$, $31^4$.
Tricholoma grammopodium, $36^7$.

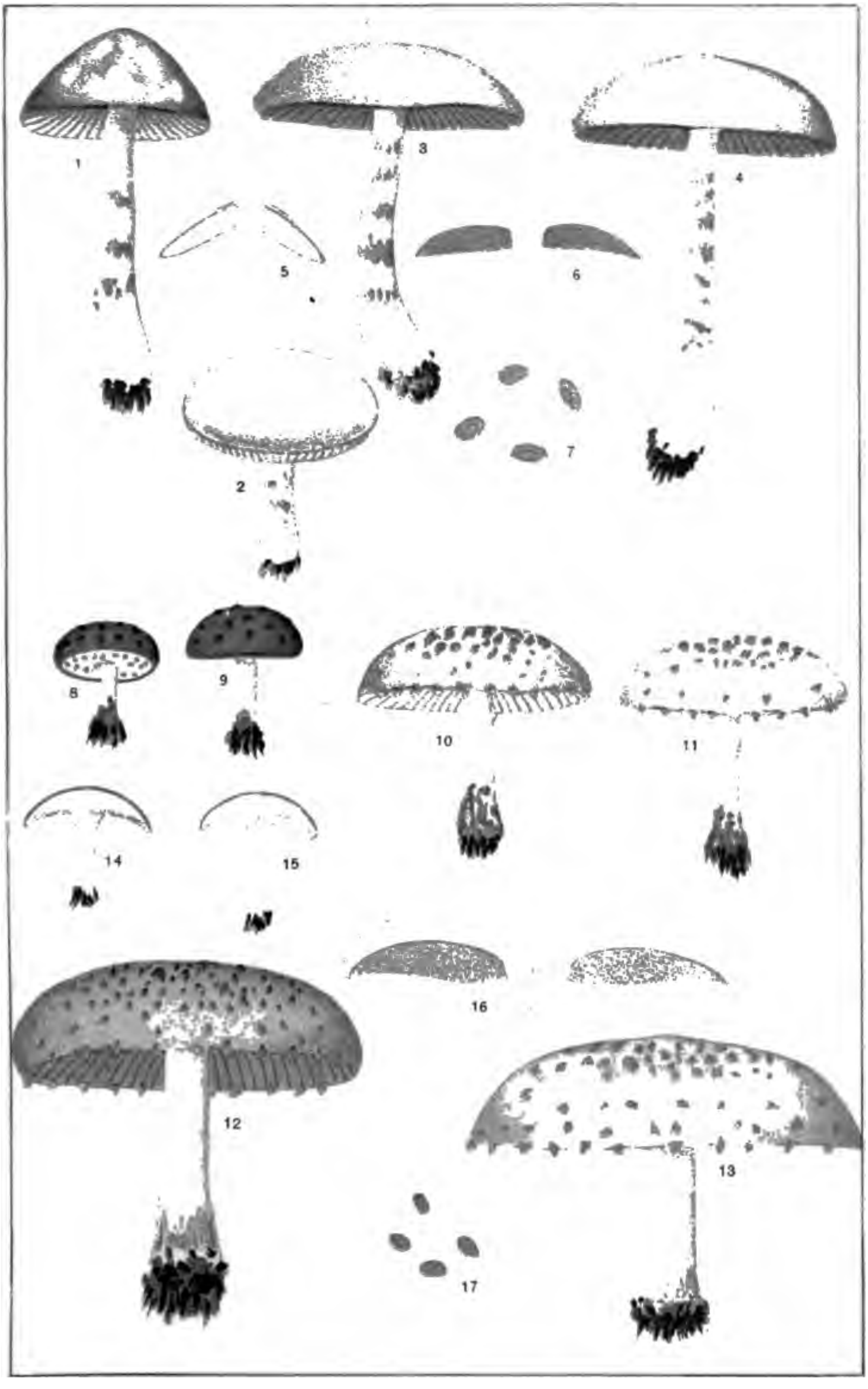
**Uredinopsis** atkinsonii, $34^9$.
osmundae, $35^1$.

**Vagnera** stellata, $43^6$.
Viburnum lentago, $43^7$.
Viola amoena, $35^3$.
blanda, $35^2$.
latiuscula, $35^3$.
palmata dilatata, $43^9$.
papilionacea domestica, $44^1$.
septentrionalis, $35^4$.
Violets, $35^3$.
northern blue, $35^4$.
Volvaria parvula, $36^6$.

**Willows**, $34^4$, $42^8$.

**Xyris** flexuosa, $35^6$.
montana, $35^5$.

**Zygodesmus** granulosus, $35^7$.



IG.1-7 CORTINARIUS HELIOTROPICUS PK. FIG. 8-17 PHOLIOTA APPENDICULAT

HELIOTROPE CORTINARIUS APPENDICULATE PHOLIOTA

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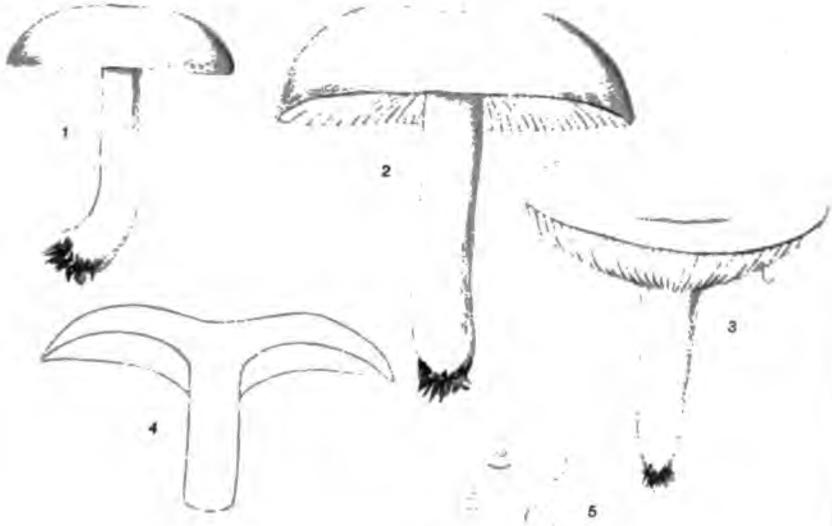
# FUNGI



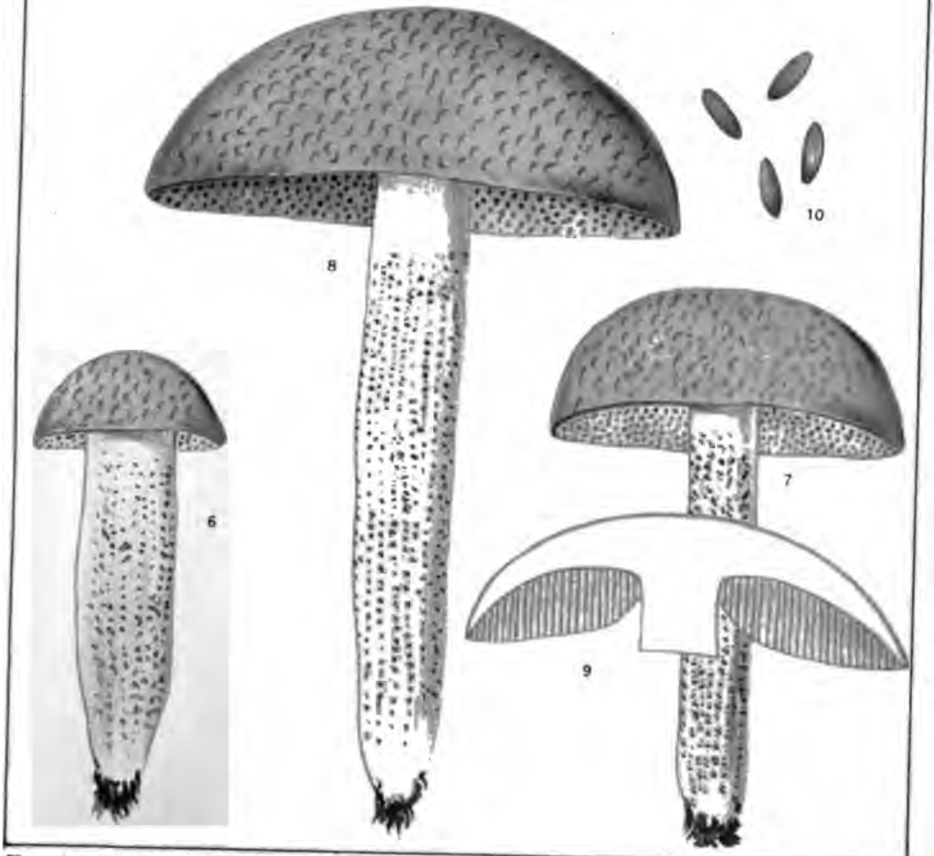


FIG. 1-5 LACTARIUS BREVIS PK.
SHORT LACTARIUS

FIG. 6-10 BOLETUS RUGOSICEPS PK.
ROUGH CAP BOLETUS

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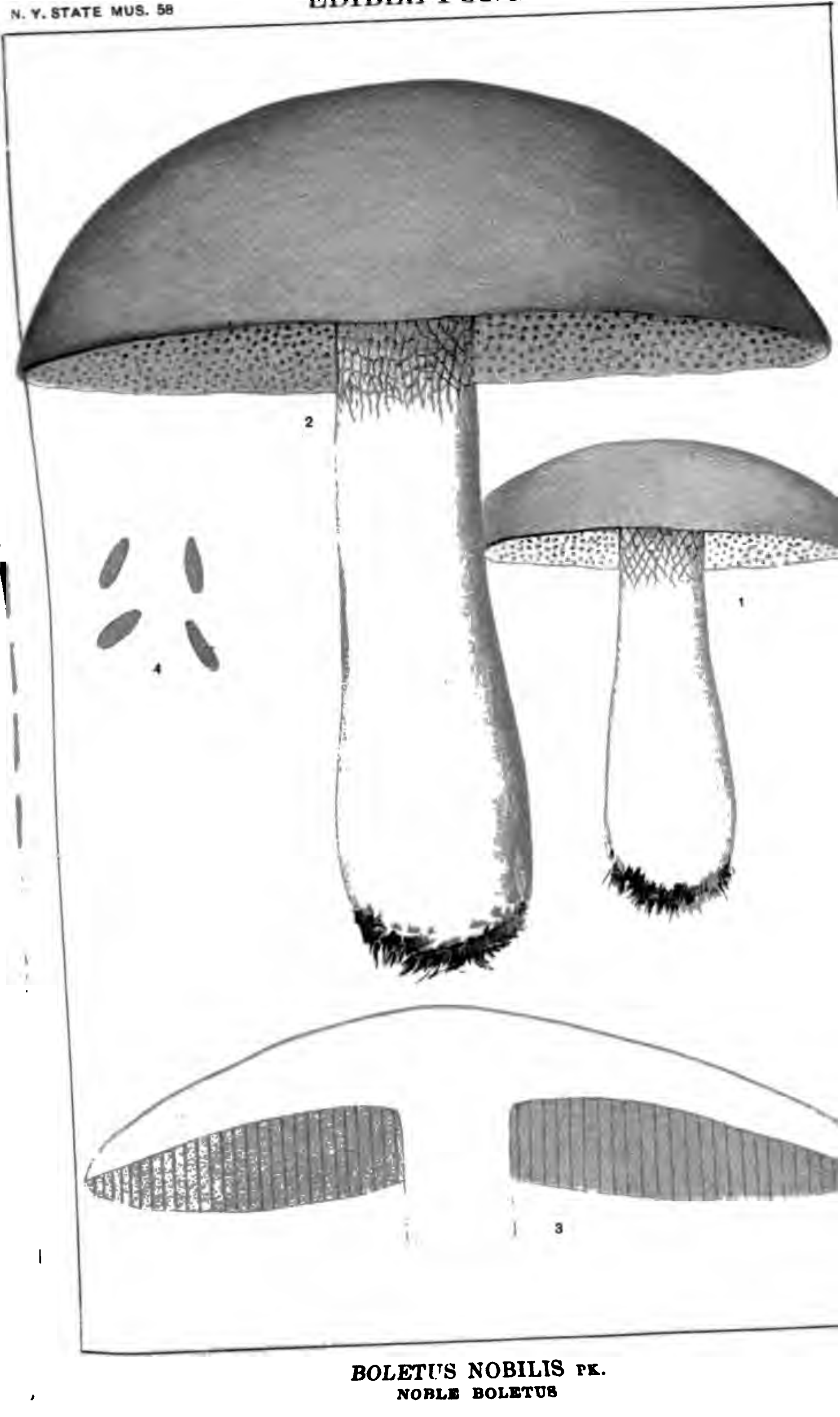


*BOLETUS* NOBILIS PK.

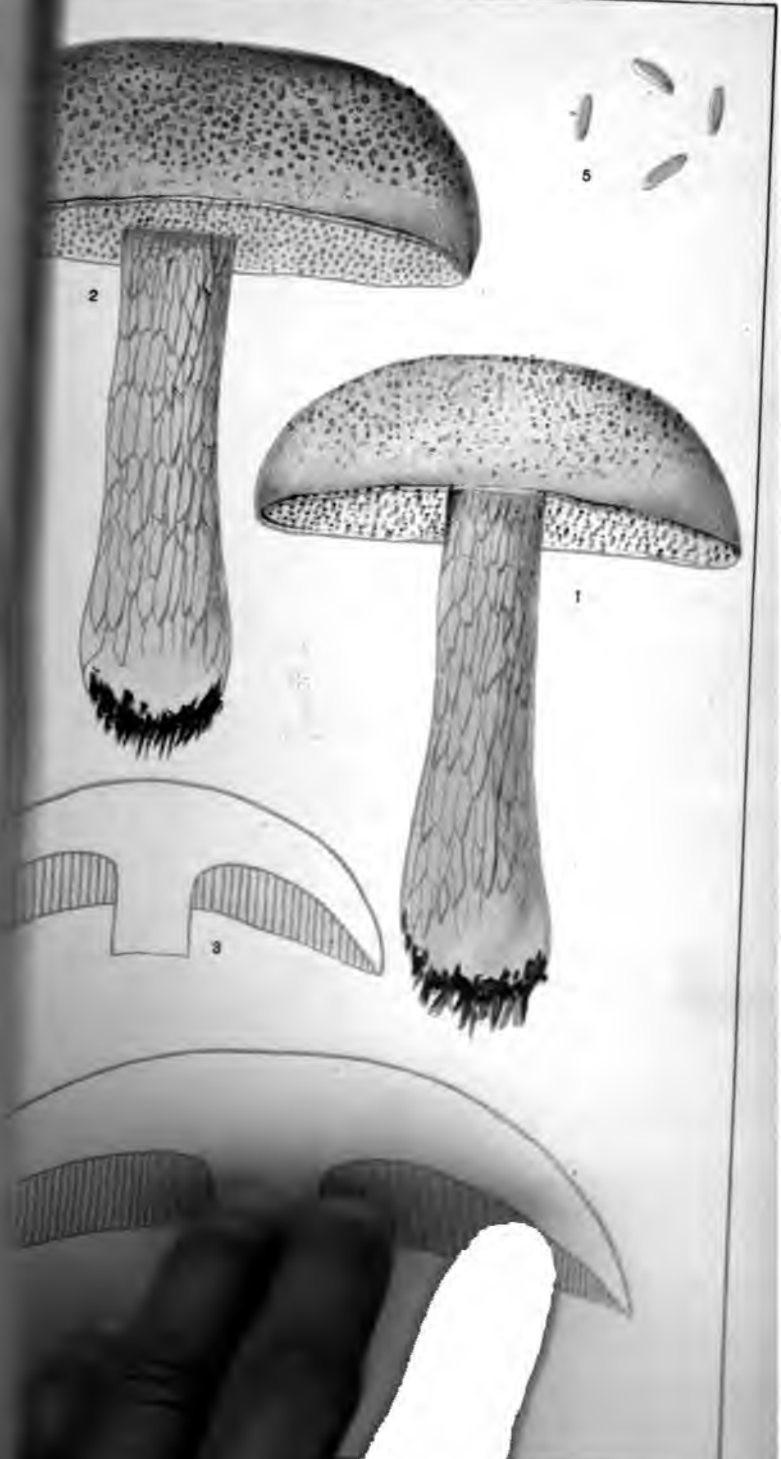
**NOBLE BOLETUS**

Stereum spadiceum $23^1$
Stereum [illegible] $21^1$
Strawberry $30^1$
Strobilomyces strobilaceus,
 explanation of plate 55,
Stropharia [illegible]

**Tenuifoliae** [illegible]
Teucrium boreale $32^1$
Thorn, Beckwith 27
 Bergman $27^1$
 [illegible]
 [illegible]
 Dodge $26^1$
 [illegible]
 Dunbar $27^1$
 Ellwanger $24^1$
 Fuller $24^1$
 Graves [illegible]
 Laney $25^1$
 light armed $25^1$
 Macauley $27^1$
 Rochester $25^1$
 round leaved [illegible]
 thin lobed $27^1$

# FUNGI

PLATE R



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**Maps.** Merrill, F. J. H. Economic and Geologic Map of the State of New York; issued as part of Museum bulletin 15 and the 48th Museum Report, v. 1. 59×67 cm. 1894. Scale 14 miles to 1 inch. *15c.*

—— Geologic Map of New York. 1901. Scale 5 miles to 1 inch. *In atlas form $3; mounted on rollers $5. Lower Hudson sheet 60c.*

The lower Hudson sheet, geologically colored, comprises Rockland, Orange, Dutchess, Putnam, Westchester, New York, Richmond, Kings, Queens and Nassau counties, and parts of Sullivan, Ulster and Suffolk counties; also northeastern New Jersey and part of western Connecticut.

—— Map of New York showing the Surface Configuration and Water Sheds. 1901. Scale 12 miles to 1 inch. *15c.*

Geologic maps on the United States Geological Survey topographic base; scale 1 in. = 1 m. Those marked with an asterisk have also been published separately.

*Albany county. Mus. rep't 49, v. 2. 1898. *50c.*
Area around Lake Placid. Mus. bul. 21. 1898.
Vicinity of Frankfort Hill [parts of Herkimer and Oneida counties]. Mus. rep't 51, v. 1. 1899.
Rockland county. State geol. rep't 18. 1899.
Amsterdam quadrangle. Mus. bul. 34. 1900.
*Parts of Albany and Rensselaer counties. Mus. bul. 42. 1901. *10c.*
*Niagara River. Mus. bul. 45. 1901. *25c.*
Part of Clinton county. State geol. rep't 19. 1901.
Oyster Bay and Hempstead quadrangles on Long Island. Mus. bul. 48. [illegible]
[illegible] Clinton and Essex counties. Mus. bul. 52. 1902.
[illegible] State geol. rep't 21. 1903.
[illegible] county and vicinity. Mus. bul. 69. 1903.
[illegible] Mus. [illegible]
[illegible] (Scale 1 in. = ½ m.) Mus. bul. 69.
[illegible] Mus. [illegible] 63. 1904. *20c.*
[illegible] Mus. bul. [illegible] *15c.*
[illegible]

*Published monthly by the*
New York State Education Department

BULLETIN [illegible]　　　　AUGUST 1905

# Higher Education

INCLUDING UNIVERSITIES, PROFESSIONAL AND TECHNICAL SCHOOLS

Bulletin 27

N. State Educ. Dept.

# PROFESSIONAL EXAMINATION PAPERS

FOR THE

Academic year 1905

| | PAGE | | PAGE |
|---|---|---|---|
| Preface | 4 | Accountant | 105 |
| Medical | 5 | Business | 164 |
| Dental | 41 | Library School | 166 |
| Veterinary | 73 | Extension | 184 |
| Registration of nurses | 101 | | |

ALBANY
NEW YORK STATE EDUCATION DEPARTMENT
1905

[illegible]　　　　Price 25 cents

Stereum spadiceum,
Stevenson, cited, $49^7$.
Strawberry, $38^7$.
Strobilomyces strobil
  explanation of plat
Stropharia cothurnat

**Tenuifoliae**, $8^2$, $25^4$, 2
Teucrium boreale, 34
Thorn, Beckwith, $27^1$,
  benignant, $27^5$
  cockspur, $8^4$.
  cup-bearing, $27^7$
  Dewey, $28^2$.
  dotted fruited, $8^5$.
  Dunbar, $27^4$.
  Ellwanger, $24^7$.
  Fuller, $24^5$.
  Graves, $7^4$.
  Laney, $28^6$.
  light armed, $28^5$.
  Macauley, $27^9$.
  Rochester, $25^3$.
  round leaved, $8^6$.
  thin lobed, $26^7$.

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*University of the State of New York*

No.

Board

Place

## College Department

### 66th Medical Examination

# ANATOMY

day, September 27, 1904—9.15 a. m. to 12.15 p. m., only

---

*wer any 10 of the questions on this paper but* **no more.** ***Check the***
*r (√) of each one of the questions you have answered.*

ive the gross anatomy of the spine.

ention the bones of the tarsus and state which of those oned enters into the formation of the ankle-joint.

ention the muscles attached to the condyles of the rus.

escribe the aorta.

ive the origin, course and approximate length of the inate vein.

scribe the receptaculum chyli.

scribe the brachial plexus.

ention the ossicles of the tympanum and give the gross ny of the group.

ve the outlines and the relations of the stomach.

Give the gross anatomy of the lungs.

Describe the alimentary tract from mouth to anus.

Describe (*a*) the male urethra, (*b*) the female urethra.

Describe the Fallopian tubes.

What is synovial membrane and where is it found?

Give the gross anatomy of the skin and its appendages.

*University of the State of New York*

No.

**College Department**

Board

**67th Medical Examination**

Place

## ANATOMY

**Tuesday,** January 24, 1905—9.15 a. m. to 12.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Give a general classification of bones and illustrate each class.

2 Mention the articulations of the occipital bone.

3 Mention the muscles controlling eye movements.

4 Describe the pulmonary artery and mention its branches.

5 Mention and describe the veins carrying arterial blood.

6 Describe the mesenteric glands.

7 Describe the great sciatic nerve and give its location.

8 Describe the crystalline lens. What changes are likely to occur in the crystalline lens in old age?

9 Give the relations of the gall-bladder.

10 What is the mediastinum? State how the mediastinum is divided and mention the contents of each division.

11 Describe the vocal cords.

12 Give the gross anatomy of the kidneys.

13 Describe the prostate gland.

14 Describe the ovaries and state their normal relations to the uterus.

15 Mention in order the tissues divided in an amputation of the middle third of the femur.

*University of the State of New York* 7

No.

Board

Place

## College Department

### 68th Medical Examination

# ANATOMY

**Tuesday,** May 16, 1905—9.15 a. m. to 12.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Give the surgical anatomy of the humerus.

2 What is the cerebellum and where is it situated? What is the size of the cerebellum as compared with that of the cerebrum?

3 Describe the structure of the pericardium and give its blood and nerve supply.

4 Name the salivary glands and their respective ducts.

5 What veins form the portal vein? Where is the portal vein situated?

6 How is the superficial palmar arch formed?

7 Describe the musculospiral nerve.

8 Describe the pleura and its reflections.

9 Wherein does the female perineum differ from the male perineum?

10 Give the origin, insertion, blood and nerve supply of *one* of the following muscles: quadriceps extensor cruris, pronator radii teres, occipitofrontalis, gluteus maximus.

11 Bound the axillary space and mention its contents.

12 What changes take place in the vascular system at birth?

13 State the differences between the right bronchus and the left bronchus.

14 Give the gross anatomy of the eye.

15 Describe the pancreas.

No.

Board

Place

## College Department

### 69th Medical Examination

## ANATOMY

**Tuesday,** June 20, 1905—9.15 a. m. to 12.15 p. m., only

---

*Answer any 10 of the questions on this paper but* no more. *Check the number (✓) of each one of the questions you have answered.*

1 Describe the articular extremities of the humerus.

2 Give a description of the general lymphatic system.

3 Describe as to structure (*a*) a vein, (*b*) a capillary, (*c*) an artery.

4 Give the microscopic appearance of compact bone tissue.

5 Describe the hip joint.

6 State the origin, insertion, action, blood and nerve supply of *one* of the following muscles: masseter, scalenus anticus, erector spinae, external oblique, tibialis anticus.

7 Describe the circle of Willis.

8 Mention the veins that empty into the inferior vena cava.

9 Give the structure of the spinal cord.

10 Describe the course of the pancreatic duct.

11 What is the pons Varolii and where is it situated?

12 Give the origin and function of the abducent nerve.

13 Describe the lobes of the liver.

14 Give the anatomy of the nasal duct.

15 Describe (*a*) Poupart's ligament, (*b*) Gimbernat's ligament.

*University of the State of New York*

No.

Board

Place

## College Department

### 66th Medical Examination

# PHYSIOLOGY AND HYGIENE

**Tuesday,** September 27, 1904—1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Mention the differences between white fibrous tissue and yellow elastic tissue in regard to structure, distribution and function.

2 Describe the manner in which the mammary glands perform their functions.

3 State the origin of fats in the body and give the ultimate fate of the absorbed fat.

4 What is the ordinary composition of feces? Give the nervous and the muscular mechanism of defecation.

5 State the average respiration and pulse beat a minute and give the average temperature of (*a*) the new-born, (*b*) the youth, (*c*) the adult, (*d*) the aged.

6 Give the specific gravity, reaction, temperature and microscopic character of the blood.

7 Give a comprehensive description of the processes by which digested food is absorbed.

8 Describe (*a*) the cornea, (*b*) the iris. State the functions of each.

9 What is the physiology of (*a*) hunger, (*b*) thirst?

10 Mention the nutritive fluids of the body and state the functions of any *one* of those mentioned.

11 Describe a method of disinfecting excreta, the person of the convalescent, the clothing and the vacated sick-room.

12 Mention the reliable sources of a pure water supply.

13 Mention the communicable diseases that come within the scope of public health administration.

14 Describe the care of the person in the tropics as to clothing, diet, habits of life and use of alcohol. Give reasons for conclusion.

15 What hygienic methods may be employed to prevent diphtheria?

*University of the State of New York*

No.

**College Department**

Board

**67th Medical Examination**

Place

# PHYSIOLOGY AND HYGIENE

**Tuesday,** January 24, 1905—1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 Describe ciliated epithelium and give its common location. State the function of ciliated epithelium.

2 Mention the conditions that hasten the coagulation of blood and state the means that may be adopted to retard or to prevent this coagulation.

3 State the chemical and mechanical functions of the saliva. What relation does the saliva bear to the sense of taste?

4 Describe in detail the digestion and elimination of a breakfast consisting of plain coffee, oatmeal with milk, ham and eggs.

5 How does the nervous system influence gastric digestion?

6 Give the mechanism of respiration. State the effect of respiration on the blood.

7 What are (*a*) toxins, (*b*) antitoxins? Give the theory on which the prophylactic and the medicinal use of antitoxins is based.

8 Compare arteries, veins and capillaries as to structure and function.

9 State the effect of (*a*) stimulation of the cervical sympathetic nerve, (*b*) section of the cervical sympathetic nerve.

10 What causes the difference between the male voice and the female voice.

11 Give the physiologic and the hygienic effects of (*a*) cold baths, (*b*) hot baths.

12 Describe the most approved method of performing vaccination and relate the complications that may occur as results of faulty methods.

13 What rules in public health administration should be promulgated to prevent the spread of pulmonary tuberculosis? How should a room recently occupied by a person suffering from tuberculosis be disinfected?

14 What is trichina spiralis? Describe the effects of trichina spiralis on the human system.

15 Describe a system of ventilation for a school-room.

*University of the State of New York* No. 11

**College Department** Board

**68th Medical Examination** Place

# PHYSIOLOGY AND HYGIENE

**Tuesday,** May 16, 1905 — 1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Describe a protoplasmic cell and its production. By what physical properties is living matter distinguished from dead matter?

2 Give the metabolism of (*a*) proteids, (*b*) carbohydrates, (*c*) fats.

3 Define hygiene, prophylaxis, contagion, infection, zymotic, ptomain, toxin, phagocytosis.

4 State the influence of the blood circulation on the secretion of urine. Explain the effect of division of the renal nerves on the secretion of urine.

5 Describe the functions of the stomach during the process of digestion.

6 How is the action of the heart affected by variations in the rate and force of respiration?

7 What are the functions of the sympathetic nervous system?

8 Give the normal temperature of the body. State how this temperature is maintained and under what conditions it is increased. What is the cause of the post-mortem rise of temperature sometimes observed?

9 Describe the physiology of vision with special reference to (*a*) the retina, (*b*) the iris, (*c*) the crystalline lens.

10 Describe the chemical interchange between blood and air during respiration and mention the forces concerned in this interchange.

11 Mention some of the common impurities of drinking-water and state how such impurities may be removed. What constitutes (*a*) hard water, (*b*) soft water?

12 Mention the dangers of excessive shade about dwellings.

13 Describe in detail a proper system of plumbing for a dwelling house and point out the characteristics of faulty plumbing.

14 State the relative food value of raw and sterilized milk.

15 How are diphtheritic antitoxins prepared? On what theory are antitoxins applied?

No.

Board

Place

## College Department

### 69th Medical Examination

## PHYSIOLOGY AND HYGIENE

**Tuesday,** June 20, 1905 — 1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Mention the varieties of connective tissue and state the special function of each.

2 Describe (*a*) the animal cell, (*b*) animal cell division.

3 What are the circulating liquids of the body? Give the functions of each.

4 Describe the physiology of hearing with special reference to the functions of (*a*) tympanic membrane and auditory ossicles, (*b*) semicircular canals, (*c*) the Eustachian tube.

5 Describe the nervous and muscular mechanism of (*a*) deglutition, (*b*) vomiting, (*c*) hiccough.

6 Describe the functions of the skin and of its appendages.

7 Mention the products of intestinal digestion and state what disposition is made of these products.

8 State the function or functions of (*a*) bilirubin, (*b*) hemoglobin, (*c*) myosinogen, (*d*) fibrinogen, (*e*) caseinogen.

9 Give the successive steps in the digestion of a meal of roast beef and potatoes.

10 What is the value of alcohol as a food?

11 How long is it advisable to quarantine (*a*) a diphtheritic patient, (*b*) a smallpox patient? Why?

12 Mention the various methods of bathing and state the hygienic rules to be observed in each method.

13 Give a detailed description of a hospital ward for babies and state the hygienic regulations to be enforced in the care of the inmates.

14 What evils arise from outside privy vaults? How may such evils be averted in cases where these vaults can not be supplanted by more modern contrivances?

15 What is the most healthful material to wear next the skin? Why?

*University of the State of New York* No. 13

**College Department** Board

**66th Medical Examination** Place

# CHEMISTRY

**Wednesday,** September 28, 1904—9.15 a.m. to 12.15 p.m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Define atom, molecule, malleability, colloids, dialysis.

2 What is chemical affinity? How does chemical affinity differ from other forces?

3 Mention *three* fixed monads, *two* fixed dyads, *one* fixed triad and *three* elements that vary in valency. Illustrate.

4 Give the history, occurrence, preparation, properties and medicinal uses of chlorin.

5 What is ozone? Give the laboratory preparation of ozone.

6 Hydrargyri oxidum flavum may be prepared by pouring a solution of mercuric chlorid into a solution of sodium hydrate; give the chemical equation. State the medicinal properties of hydrargyri oxidum flavum.

7 Mention the oxids of iron and give the formula of *one* of them.

8 What is lunar caustic? How is lunar caustic prepared and what are its medicinal uses?

9 How do human milk and cow's milk differ? What chemical changes take place in milk when it is exposed to atmospheric influences?

10 State the general composition of fats and give the chief constituents of (*a*) tallow, (*b*) butter, (*c*) olive-oil.

11 Give the composition and properties of urea.

12 What is the usual composition of urinary calculi? Give the test for recognizing the principal ingredient.

13 Differentiate combustion, decay, fermentation and putrefaction. State the nature of these processes and mention the conditions under which they take place.

14 How may lead enter the system and produce chronic lead poisoning? Give the diagnosis of lead poisoning and mention the chemical antidotes for it.

15 Describe a test for the recognition of sugar in the urine and detail a procedure for avoiding possible errors.

No.

Board

Place

## College Department

### 67th Medical Examination

## CHEMISTRY

**Wednesday,** January 25, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 Differentiate mechanical divisibility and chemical divisibility.

2 Describe a method of generating *one* form of electricity. State the uses of this form.

3 Give the common name, formula, properties, preparation and uses of zinc sulfate.

4 Give the formula and method of manufacture of potassium nitrate.

5 Give the chemistry of hydrogen.

6 Define amid, anilid, radical, chemical chain, residue.

7 Give the symbol, atomic weight and valence of *five* nonmetals.

8 Illustrate the significance of *each* of the following terminations: *ate*, *ite*, *ous*, *ic*, *id*.

9 Iodin is precipitated from sodium iodate by sodium bisulfite and sulfur dioxid; describe the reaction in chemical equation.

10 Determine the composition of water by (*a*) analysis, (*b*) synthesis.

11 State the composition, properties and the mode of manufacture of carbolic acid. Give tests for carbolic acid.

12 Describe starch. How may starch be recognized chemically? What substance is formed when diastase or dilute acids act on starch?

13 State the theory of the ions.

14 Mention the principal products obtained from petroleum and describe the properties of *one* of the products mentioned.

15 What is the source of uric acid in the economy? Give the formula and properties of uric acid and mention its chemical tests.

*University of the State of New York* 15

No.

Board

Place

## College Department

### 68th Medical Examination

## CHEMISTRY

**Wednesday,** May 17, 1905—9.15 a. m. to 12.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Define isomorphous, amorphous, crystalline, galvanic, polarization.

2 Explain the uses of the spectroscope in chemical analysis.

3 State the normal reaction of urine. How is the reaction determined and to what is it due?

4 Mention *five* elementary substances commonly used in medicine in a pure or uncombined state.

5 Describe a method of producing an electric current by chemical action.

6 Give the symbol, valence, occurrence in nature, physical properties and chemical properties of *one* of the following: bromin, silicon, copper, antimony, manganese.

7 How is carbolic acid prepared? Give the treatment of carbolic acid poisoning.

8 Distinguish between alcoholic fermentation and putrefaction.

9 Give the properties of potassium. Mention *five* compounds of potassium important in medical practice.

10 What is the chemical name of tartar emetic? Describe tartar emetic as to properties and uses.

11 Mention a secretion of the body that contains (*a*) cholesterin, (*b*) pepsin, (*c*) trypsin, (*d*) casein, (*e*) bilirubin.

12 What reaction takes place when chloral hydrate is mixed with an alkali? Illustrate.

13 Give the chemical reaction of (*a*) saliva, (*b*) gastric juice, (*c*) tears, (*d*) bile, (*e*) blood.

14 Mention the most important acetates and give a method of preparing *one* of them.

15 Complete the following equations:

$BaS+CO_2+H_2O=$

$3Cu+8HNO_3=$

**No.**
**Board**
**Place**

## College Department

### 69th Medical Examination

# CHEMISTRY

**Wednesday, June 21, 1905—9.15 a. m. to 12.15 p. m., only**

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 What are salts and how are they formed? Define neutral salt, acid salt, double salt.

2 Mention *five* elements found only in combination. Into what groups are elements divided? Illustrate.

3 Give a method of determining atomic weight by chemical means.

4 Define sublimation, distillation, static electricity, galvanic cell, organic compound.

5 Mention the halogens. Why are they so called? Give the formulas of *three* compounds each of which shall contain a different halogen.

6 State the sources of ammonium compounds. Give the composition, the method of preparation and the properties of sal ammoniac.

7 Give a test for (*a*) ferric compounds, (*b*) ferrous compounds. Write the chemical names and the formulas of *three* salts of iron used in medicine.

8 Give the normal specific gravity of urine. State the pathologic and the nonpathologic causes of abnormal deviations in the urinary specific gravity.

9 What is the composition of atmospheric air? Define humidity of the atmosphere, rarity of the atmosphere.

10 What is the chemical antidote for lead acetate poisoning? Explain the chemical action of this antidote.

11 Define electrolysis, ions.

12 What are (*a*) albuminoids, (*b*) proteids? Give examples of each.

13 Give the formula of (*a*) common (ethyl) alcohol, (*b*) sulfuric ether, (*c*) acetic acid.

14 How is nitroglycerin prepared? State the medicinal uses of nitroglycerin.

15 Mention *four* alkaloids of opium.

*University of the State of New York*

No.

Board

Place

**College Department**

**66th Medical Examination**

## SURGERY

**Wednesday,** September 28, 1904—1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Mention the agents used for producing general anesthesia. State the indications to be followed in the selection of an agent for producing anesthesia for surgical purposes.

2 Give a differential diagnosis of tumors of the breast.

3 Give the indications for inguinal colostomy and describe the operation.

4 Describe a dressing for (*a*) fracture of the lower end of the radius, (*b*) fracture of the clavicle, (*c*) fracture of the lower end of the humerus.

5 Give a differential diagnosis of dislocation from (*a*) contusion, (*b*) fracture, (*c*) other pathologic conditions.

6 Mention the signs of wound of a joint.

7 Give the causes, signs and treatment of rupture of a muscle.

8 Describe repair of arteries and veins.

9 What is chancroid? Give the treatment of chancroid.

10 Give the etiology and general pathology of acute appendicitis. Mention *two* prominent symptoms common to all forms of the disease.

11 Give the symptoms and treatment of irritable ulcer and fissure of the anus.

12 Mention, in order of frequency of occurrence, *three* of the most common forms of malposition of the uterus. Describe *one* form of malposition of the uterus and give treatment.

13 What lesions may follow a catarrhal inflammation of the Eustachian tube?

14 Describe acute peritonsillar cellulitis with suppuration and give treatment.

15 Describe rhus dermatitis and give treatment.

No.

Board

Place

## College Department

### 67th Medical Examination

## SURGERY

**Wednesday, January 25, 1905 — 1.15 to 4.15 p. m., only**

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Define contusion, hematoma, synovitis, fracture, dislocation, sprain, sepsis, asepsis, antisepsis, sterilization.

2 What are the characteristics of a chondroma? In what parts of the body are chondromata most frequently found?

3 Give the indications for nephrectomy and describe the operation.

4 Give the immediate treatment of compound fracture.

5 Mention the varieties of dislocation of the clavicle. Describe the treatment of *one* variety.

6 Give the symptoms, diagnosis and treatment of gonorrheal arthritis.

7 Define diastasis. Mention the predisposing and the exciting causes of diastasis.

8 Differentiate arterial hemorrhage, venous hemorrhage and capillary hemorrhage. On what properties possessed by the blood and vessels does the spontaneous arrest of hemorrhage depend?

9 Give the causes and treatment of rupture of the urinary bladder.

10 Give the physical signs of dilation of the stomach following tumor obstructing the pylorus.

11 Describe stricture of the rectum. Mention the causes and symptoms of stricture of the rectum.

12 Make a differential diagnosis of appendicitis and tubo-ovarian disease.

13 Give the causes, symptoms and treatment of acute iritis.

14 What complications may attend internal injuries of the esophagus?

15 Give the causes, symptoms and treatment of erythema pernio (chilblains).

*University of the State of New York*

No.

Board

Place

## College Department

### 68th Medical Examination

# SURGERY

**Wednesday,** May 17, 1905 — 1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Classify wounds and give the treatment of *one* variety.

2 Describe teratomata and give their situations.

3 Describe in detail an amputation in the lower third of the thigh.

4 Give (*a*) the predisposing causes of fracture, (*b*) the immediate or determining causes of fracture.

5 Mention the accidents that are liable to occur during the reduction of a dislocation.

6 Give the symptoms and treatment of acute synovitis.

7 Give the causes, symptoms and treatment of stricture of the esophagus.

8 State the special danger of a wound of the femoral vein. Give the treatment of a wound of the femoral vein.

9 Give the differential diagnosis of hypertrophy of the prostate and abscess of the prostate.

10 What are the various forms of abdominal hernia? Describe congenital hernia.

11 Differentiate anal fistula, anal fissure, hemorrhoids and carcinoma of the rectum.

12 Mention in order of frequency of occurrence *four* of the most common pathologic conditions of the cervix uteri.

13 Give the causes, symptoms and treatment of mastoiditis.

14 What is torticollis? Give the causes, symptoms and treatment of spasmodic torticollis.

15 Describe rodent ulcer. Give treatment.

No.

Board

Place

## College Department

### 69th Medical Examination

## SURGERY

**Wednesday,** June 21, 1905 — 1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Give the indications for reopening wounds.

2 Describe in detail nitrous oxid anesthesia.

3 Give the various surgical methods of treating epilepsy.

4 Give the symptoms, diagnosis and treatment of fracture of the lower end of the fibula with avulsion of the internal malleolus (Pott's fracture).

5 What is understood by spontaneous dislocation? Describe a form of spontaneous dislocation.

6 Give the indications for tracheotomy and describe the operation.

7 Give the etiology and treatment of epistaxis.

8 Give the signs and symptoms of popliteal aneurism and indicate the treatment.

9 Give the symptoms and treatment of vesical calculus.

10 What conditions of the kidney require nephrectomy?

11 Describe an operation for the cure of prolapse of the rectum.

12 Give the symptoms and treatment of rupture of the bladder.

13 Give the treatment of contusion of the eyeball and describe the sequelæ.

14 Give the differential diagnosis of hydrothorax and empyema. Give the treatment of *one* of these conditions.

15 What are the indications for curetting the uterus? Describe the operation.

*University of the State of New York*

No.

## College Department

Board

### 66th Medical Examination

Place

# OBSTETRICS

**Thursday,** September 29, 1904—9.15 a. m. to 12.15 p. m., only

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 Give a description of the external female genital organs and state the function of each.

2 Describe the physiology of insemination.

3 Give the positive signs of pregnancy.

4 Make a differential diagnosis of pregnancy at the sixth month.

5 Define the "kidney of pregnancy," state its dangers and give its treatment.

6 Describe the three stages of normal labor.

7 Give an example of abnormal labor and state how the case mentioned should be managed.

8 Describe Walcher's position and state the advantages claimed for it.

9 Define the puerperal state. Give general directions for the care of the mother during the puerperium.

10 Give the etiology, pathology and treatment of accidental hemorrhage in pregnancy.

11 How may gonorrheal infection affect the new-born child? What should be done to prevent and to cure this infection in the new-born?

12 Define transverse presentation and state how it should be managed.

13 Differentiate (*a*) anteversion of uterus and retroversion of uterus, (*b*) anteflection of uterus and retroflection of uterus.

14 Give the etiology and treatment of varices in pregnancy.

15 Make a diagnosis of carcinoma of the cervix uteri, and state the procedure if this condition is recognized during (*a*) pregnancy, (*b*) labor.

No.

Board

Place

## College Department

**67th Medical Examination**

# OBSTETRICS

**Thursday,** January 26, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Give a description of the internal female genital organs and state the function of each.

2 Describe the various stages in the development of sexual reproduction.

3 State the signs and symptoms of pregnancy (*a*) before quickening, (*b*) after quickening.

4 Give general directions for the management of a normal pregnancy.

5 What are the causes of toxemia of pregnancy? Give the management and state the results of this condition.

6 Describe the causes of dystocia as they relate to (*a*) the mother, (*b*) the child. Narrate the symptoms and give the management of a case of dystocia from any cause.

7 Give the scientific definition of (*a*) abortion, (*b*) miscarriage, (*c*) premature labor.

8 Mention the causes of puerperal infection. State how puerperal infection may be prevented.

9 Give directions to be followed during pregnancy and the puerperium for (*a*) care of the nipples, (*b*) care of the breasts, (*c*) care of the abdomen. State method of calculating the date of confinement.

10 Give a clinical description of puerperal insanity. State the causes and management of this condition.

11 When is accouchement forcé indicated and how should it be performed?

12 Describe the several steps in a high forceps delivery.

13 Mention the indications for puerperal curettage. State the dangers and give the technic of this operation.

14 Give the causes, pathology and management of salpingitis.

15 How and when should an operation for laceration of the perineum from childbirth be performed?

*University of the State of New York* No. 23

## College Department

Board

**68th Medical Examination**

Place

# OBSTETRICS

**Thursday,** May 18, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Mention the external and the internal female organs of generation and describe the functions of the more important ones in each group.

1 2 Define menstruation, describe its function and state its reaction to ovulation.

3 State the possible results of gonorrheal infection in the pregnant woman.

4 Mention and describe the principal subjective symptoms of pregnancy.

5 What changes in the uterus does pregnancy effect?

6 What is hyperemesis? Give the symptoms, course and treatment of hyperemesis of pregnancy.

7 State the causes of inertia uteri and give the management of this condition.

8 Describe the management of the perineum during dilatation and during delivery of the head.

9 Mention the indications for manual extraction of the placenta. Give technic of this procedure.

10 Describe the symptoms and give the treatment of asphyxia neonatorum.

11 What chief uterine displacements may affect early pregnancy and how are they treated?

12 What is salpingitis? Give the causes, symptoms and treatment of salpingitis.

13 Define vaginismus and give its causes, symptoms and treatment.

14 What are the causes and symptoms of endometritis? Give treatment.

15 Differentiate prolapsus of the uterus and inversion of the uterus. Give the treatment of each condition.

*University of the State of New York*

No.

Board

Place

## College Department

### 69th Medical Examination

## OBSTETRICS

**Thursday, June 22, 1905—9.15 a. m. to 12.15 p. m., only**

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*Answer any 10 of the questions on this paper but* no more. *Check the number* (√) *of each one of the questions you have answered.*

1 What are the physiologic processes concerned in the reproduction of the species?

2 Describe the changes that take place in the uterus as the result of pregnancy.

3 Give the causes and treatment of pernicious vomiting in pregnancy.

4 What signs and symptoms, subjective and objective, should be considered in making a diagnosis of pregnancy?

5 Give some general rules for the application of asepsis and antisepsis in the obstetric chamber in private practice.

6 Mention the conditions that justify the induction of abortion (not premature labor). What appropriate means may be employed to induce abortion?

7 Define *accouchement forcé*, state indications for its employment and describe appropriate methods for performing it

8 Give the diagnosis and management of a brow presentation.

9 Describe the technic employed in the delivery of a retained and adherent placenta.

10 How may an occipito-posterior position influence labor? Give the management of an occipito-posterior position.

11 Mention the indications for version and state methods of performing the operation.

12 What special immediate care should the newborn infant receive? State the diet of the newborn in case lactation has failed.

13 Describe the left lateral position, also known as the semiprone or Sims's posture, and state its principal gynecologic advantages.

14 Describe the technic of bimanual palpation. State the special purposes of bimanual palpation.

15 State the uses and dangers of the uterine sound and describe the technic of its employment.

No.

Board

Place

## College Department

### 66th Medical Examination

# PATHOLOGY AND DIAGNOSIS

**Thursday,** September 29, 1904—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 Describe the process of (*a*) simple inflammation, (*b*) connective tissue formation.

2 Give the etiology and pathology of erysipelas.

3 What metabolic changes take place in fever?

4 What is phagocytosis? How is phagocytosis accomplished?

5 Describe the arterial changes in arteriosclerosis. Mention the secondary lesions that may be produced by arteriosclerosis in (*a*) the heart, (*b*) the kidney, (*c*) the brain.

6 Give the histologic characteristics of (*a*) epithelial tumors, (*b*) connective tissue tumors.

7 What pathologic lesions commonly occur in (*a*) angina pectoris, (*b*) Addison's disease, (*c*) acromegaly?

8 What normal bacterial inhabitant of the body may be confounded with the cause of tuberculosis? Describe the throat lesions in tuberculosis of the larynx.

9 Give a differential diagnosis of follicular tonsillitis and diphtheritic infection of the tonsils.

10 Describe the rash of (*a*) acne, (*b*) scarlet fever, (*c*) measles.

11 Give the causes and symptoms of intestinal obstruction.

12 Mention the characteristics of the pulse in (*a*) aortic insufficiency, (*b*) mitral regurgitation, (*c*) chronic interstitial myocarditis.

13 What diagnostic value has the presence or the absence of the deep reflexes? How may the knee-jerk be produced?

14 Differentiate aphonia and aphasia.

15 Describe the naked eye appearances of the abdominal organs and of the tongue as seen in a typical case of typhoid fever.

*University of the State of New York*

No.

## College Department

Board

**67th Medical Examination**

Place

# PATHOLOGY AND DIAGNOSIS

**Thursday,** January 26, 1905—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 What conditions and environments influence body temperature in health? How does injury to the nerve-centers influence body temperature? Explain.

2 Define thrombus, embolus, infarct. Describe the mechanism of an infarct in the spleen.

3 Describe the microscopic lesion in infantile spinal paralysis.

4 What is the significance of adhesions in a serous cavity or in a joint? Describe the method of their formation.

5 What retrogressive changes take place in arteries?

6 Describe blood-plates. What blood changes occur in chronic lymphemia?

7 Describe the condition of the urine in (*a*) chronic parenchymatous nephritis, (*b*) chronic interstitial nephritis.

8 Give a method of demonstrating the existence of tubercle-bacillus in sputum.

9 What pathologic changes occur in the skin in chronic eczema?

10 Give the technic of a physical examination of (*a*) the chest, (*b*) the abdomen.

11 Compare the physical signs of lobar pneumonitis with those of empyema.

12 Give the physiologic causes of persistent vomiting.

13 What is leucocytosis? State the diagnostic significance of leucocytosis. Describe a method of counting the leucocytes.

14 Give a description of a typical case of malarial fever.

15 Distinguish functional heart murmurs from organic heart murmurs.

*University of the State of New York*

No.

Board

Place

College Department

**68th Medical Examination**

## PATHOLOGY AND DIAGNOSIS

**Thursday**, May 18, 1905—1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 What is traumatic infection? How does it take place and how may it be avoided?

2 What pathologic conditions increase vocal fremitus?

3 Define thrombus, embolus, infarct.

4 Mention *five* kinds of bacteria known to be pathogenic in man and name the disease or diseases with which each kind mentioned is associated.

5 Describe the pathologic lesions in typhoid fever.

6 Give the pathology and the clinical history of locomotor ataxia.

7 What is the Widal reaction? Give the technic of an examination showing this reaction.

8 What adventitious sounds may be heard in auscultation of the heart?

9 In a typical case of diabetes mellitus what is the condition of the urine as to (*a*) specific gravity, (*b*) color, (*c*) odor, (*d*) quantity voided, (*e*) constituents?

10 What diseases may cause occlusion of the common bile duct?

11 Give the periods of incubation, of invasion and of eruption of the acute exanthematous diseases.

12 Describe the value of the microscope as an aid to diagnosis in (*a*) suspected diphtheria, (*b*) suspected gonorrhea, (*c*) suspected tuberculosis, (*d*) suspected nephritis, (*e*) suspected leprosy.

13 What is understood by immunity from disease? Illustrate.

14 Give some of the causes of vomiting. What characteristics of vomited matter may be useful in making a diagnosis?

15 Differentiate abscess of the liver and cancer of the liver.

No.

Board

Place

## College Department

### 69th Medical Examination

# PATHOLOGY AND DIAGNOSIS

**Thursday,** June 22, 1905—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

**1 What is an embolus? Mention frequent sources of emboli. State the sequels of embolism.**

**2 Mention the causes of cardiac hypertrophy.**

**3 Give the pathology of arteriosclerosis.**

**4 Mention the characteristic bone changes in rachitis.**

**5 What is the composition of the inflammatory exudates? Describe healing by granulation.**

**6 Define phlegmon, abscess, ulcer, fistula, furuncle, carbuncle, caries.**

7 Describe gangrene and its varieties. What is the line of demarcation in gangrene?

8 What are the secondary heart changes in chronic mitral disease?

9 Mention the syphilitic lesions of the brain and of the spinal cord.

10 Describe leucemia. What pathologic changes occur in leucemia?

11 Give an outline of the structural changes that occur in phthisis pulmonalis.

12 Differentiate intermittent, remittent and continued fever.

13 Give the gross and the microscopic appearance of an epithelioma of the lip.

14 How may pleuritic friction sounds be distinguished from râles occurring in the bronchial tubes?

15 Differentiate cardiac dyspnoea, nervous dyspepsia and asthma.

*University of the State of New York* No. 29

**College Department** Board

**66th Medical Examination** Place

# Therapeutics, Practice and Materia Medica

**Friday,** September 30, 1904—9.15 a. m. to 12.15 p. m., only

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" . . . in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."

Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the **Medical Society** of the State of New York.

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Give the therapeutic uses of dilute hydrocyanic acid.

2 Define bronchiectasis and give its etiology.

3 Mention *three* stimulating expectorants and state the dose of each.

4 Give the therapeutic uses of (*a*) calcium chlorid, (*b*) calcium sulfid.

5 Give the symptomatology of cholelithiasis.

6 State the dose of (*a*) wine of colchicum root, (*b*) wine of colchicum seed, (*c*) tincture of colchicum seed.

7 Give the therapeutic uses of capsicum.

8 In what conditions is diaphoresis indicated?

9 Give the sources of salicylic acid. State the dose of salicylic acid.

10 Give the therapeutic uses of chloral hydrate.

11 Give the etiology and treatment of tapeworm.

12 Mention a vesicant from (*a*) the animal kingdom, (*b*) the mineral kingdom, (*c*) the vegetable kingdom.

13 Describe the therapeutic uses of the preparations of zinc.

14 Describe the etiology of yellow fever.

15 Mention *five* drugs that are chemically incompatible with tannic acid.

No.

Board

Place

## College Department

### 67th Medical Examination

# Therapeutics, Practice and Materia Medica

Friday, January 27, 1905—9.15 a. m. to 12.15 p. m., only

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" . . . in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."

Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the **Medical Society** of the State of New York.

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Compare strychnin sulfate with strychnin nitrate for hypodermic use.

2 Give the etiology, symptomatology and prognosis of tabes dorsalis.

3 Mention the antagonists of veratrum viride.

4 State the therapeutic uses of gallic acid.

5 Give the causes and results of the uric acid diathesis.

6 State the average adult dose of (*a*) powdered opium, (*b*) tincture of opium, (*c*) camphorated tincture of opium, (*d*) morphin sulfate, (*e*) codein.

7 Give the source and the therapeutic uses of terpin hydrate.

8 Give the etiology, diagnosis and treatment of sciatica.

9 Define oxytocic. Mention *three* oxytocics.

10 Give the therapeutic uses of nux vomica.

11 In what disease is hemoptysis a frequent complication? Give the treatment of hemoptysis.

12 Mention *five* saline purgatives and state the dose of each.

13 Give the therapeutic uses of pilocarpin.

14 How is intermittent malarial fever differentiated from remittent malarial fever? Give the treatment of intermittent malarial fever.

15 What is the chemical antidote for arsenic? Give the dose of this antidote.

*University of the State of New York* No. 31

## College Department

Board

**68th Medical Examination**

Place

# Therapeutics, Practice and Materia Medica

**Friday,** May 19, 1905—9.15 a. m. to 12.15 p. m., only

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" . . . in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."

Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the **Medical Society** of the State of New York.

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Give the therapeutic uses of eucalyptus and mention its preparations.

2 Give the causes of hemoptysis.

3 Of what is lupulin an alkaloid? State the doses of the preparations of lupulin.

4 State the uses of ergot other than its use in obstetrics.

5 Define catalepsy and give its etiology and prognosis.

6 What part of senna is used in medicine? State the physiologic action of senna.

7 Describe the therapeutics of sulfonal. State the dose of sulfonal.

8 Give the symptomatology of scarlet fever.

9 Mention *three* alkaloids of opium and state the dose of each.

10 Describe the therapeutics of oxygen.

11 Define Hodgkin's disease and outline its treatment.

12 Mention the official preparations of ammonia. State the effect of ammonia on the heart.

13 Give the therapeutic uses of naphthalin.

14 Outline the treatment of pernicious anemia. Give the prognosis of pernicious anemia.

15 State the action of medicinal doses of camphor on (*a*) the skin, (*b*) the circulation.

No.

## College Department

Board

### 69th Medical Examination

Place

## Therapeutics, Practice and Materia Medica

### Friday, June 23, 1905—9.15 a. m. to 12.15 p. m., only

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"... in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."

Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the Medical Society of the State of New York.

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Give the therapeutic uses of gelsemium.

2 Give the physical signs and the treatment of pericarditis.

3 On what change of castor oil in the intestinal tract does its purgative action depend?

4 Give the therapeutic uses of acetic acid.

5 Give the treatment of diabetes insipidus.

6 Give the physiologic action of podophyllum. Mention the name and state the dose of resin of podophyllum.

7 Give the therapeutic uses of prunus Virginiana.

8 Define anthrax and give its etiology and treatment.

9 What is the proportion of mercury in blue mass? State the dose of blue mass.

10 Define styptics and hemostatics. Mention (*a*) *two* styptics, (*b*) *two* hemostatics.

11 Of what pathologic condition is acute nasal catarrh a symptom? Describe the treatment of acute nasal catarrh.

12 How do tinctures differ from spirits? Give an example of each.

13 Describe the therapeutic uses of iodoform. State the dose of iodoform for internal administration.

14 Mention the sequels of influenza (grip). Give treatment.

15 State the sources and the dose of salicylic acid.

*University of the State of New York* No. 33

## College Department

Board

**66th Medical Examination**

Place

# Therapeutics, Practice and Materia Medica

**Friday,** September 30, 1904—9.15 a. m. to 12.15 p. m., only

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"... in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."

Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the **Homeopathic Medical Society** of the State of New York.

*Answer any 10 of the questions on this paper but* no more. *Check the number* (✓) *of each one of the questions you have answered.*

1 Describe the headache of argentum nitricum.

2 Describe the treatment of diphtheria.

3 Describe the headache of (*a*) belladonna, (*b*) cimicifuga, (*c*) spigelia, (*d*) silicea.

4 Give the characteristic mental symptoms of belladonna, hyoscyamus and stramonium.

5 Describe the cough of (*a*) rumex, (*b*) scilla maritima, (*c*) spongia, (*d*) sticta.

6 Give the indications for *three* remedies useful in menorrhagia.

7 Give the symptoms calling for aloes, baptisia, mercurius corrosivus and nux vomica in dysentery.

8 Give the indications for *three* remedies curative in facial erysipelas.

9 Give the chief characteristics of sepia.

10 Describe the diarrhea of croton tiglium.

11 Give the characteristic symptoms of secale.

12 Describe the chill symptoms of capsicum.

13 Describe the treatment of scarlatina.

14 Mention the chief clinical uses of zincum metallicum.

15 Give the characteristic skin symptoms of arsenicum, graphites and mezereum.

No.

Board

Place

## College Department

### 67th Medical Examination

## Therapeutics, Practice and Materia Medica

**Friday,** January 27, 1905—9.15 a. m. to 12.15 p. m., only

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" . . . in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."

Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the **Homeopathic Medical Society** of the State of New York.

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Give the symptoms calling for carbo vegetabilis, belladonna, trillium, millefolium, sabina and secale in hemoptysis.

2 Give the treatment of spasmodic croup.

3 Give the eye symptoms of argentum nitricum.

4 Describe the urinary symptoms of belladonna, cantharis, equisetum and mercurius corrosivus.

5 Give the medicinal treatment of appendicitis.

6 State the clinical uses of conium maculatum.

7 Describe the hepatic symptoms of chelidonium.

8 Give the homeopathic treatment of pleurisy.

9 Describe the homeopathic treatment of lobar pneumonitis.

10 Describe the cough of (*a*) hyoscyamus, (*b*) senega, (*c*) sanguinaria Canadensis.

11 Describe the characteristic chest symptoms of antimonium tartaricum.

12 Describe the stomach symptoms of sepia.

13 Give the treatment of a case of gonorrhea.

14 Give the indications for calcaria carbonica in cholera infantum.

15 Give *four* characteristics of pulsatilla.

*University of the State of New York* No. 35

## College Department

Board

**68th Medical Examination**

Place

# Therapeutics, Practice and Materia Medica

**Friday,** May 19, 1905—9.15 a. m. to 12.15 p. m., only

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" . . . in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."

Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the **Homeopathic Medical Society** of the State of New York.

*Answer any 10 of the questions on this paper but* no more. *Check the number* (√) *of each one of the questions you have answered.*

1 Differentiate arnica and hepar sulfuris in boils.

2 Give the symptoms of baptisia in typhoid fever.

3 State the therapeutic uses of asafetida.

4 Differentiate the coughs of rumex crispus and bryonia.

5 Describe the headache of sanguinaria Canadensis.

6 Describe the headache of lilium tigrinum.

7 Describe the eye symptoms of bryonia.

8 Give the indications for sabina in metrorrhagia.

9 Describe herpes zoster and give treatment.

10 Differentiate lachesis and lycopodium in diphtheritis.

11 What condition in scarlet fever calls for arum triphyllum?

12 Give the indications for *three* remedies curative in orchitis.

13 Give the symptoms and treatment of gall-stone colic.

14 Differentiate measles and smallpox.

15 Describe the diarrhea of croton tiglium.

No.
Board
Place

## College Department

### 69th Medical Examination

## Therapeutics, Practice and Materia Medica

Friday, June 23, 1905—9.15 a. m. to 12.15 p. m., only

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" . . . in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."

Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the **Homeopathic Medical Society** of the State of New York.

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Differentiate alumina and opium in constipation.

2 Give the homeopathic indications for digitalis in heart diseases.

3 Differentiate cimicifuga and rhus toxicodendron in rheumatism.

4 Differentiate carbo vegetabilis and argentum nitricum in diseases of the stomach.

5 When is viburnum opulus indicated in dysmenorrhea?

6 Give the symptoms and treatment of acute pleurisy.

7 Differentiate belladonna and glonoin in headache.

8 Differentiate aesculus hippocastanum and aloe socotrina in hemorrhoids.

9 Give the characteristic respiratory symptoms of ipecac.

10 How should a case of renal colic be treated?

11 Differentiate carbo vegetabilis and muriatic acid in typhoid fever.

12 Give the general characteristics and the therapeutic uses of picric acid.

13 Describe the cough of (*a*) belladonna, (*b*) hyoscyamus, (*c*) rumex crispus.

14 Give the urinary symptoms of cantharis.

15 Describe the treatment of acute gout.

*University of the State of New York* No. 37

College Department Board

66th Medical Examination Place

# Therapeutics, Practice and Materia Medica

Friday, September 30, 1904—9.15 a. m. to 12.15 p. m., only

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> " . . . in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."
>
> Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the Eclectic Medical Society of the State of New York.

*Answer any 10 of the questions on this paper but* no more. *Check the number* (√) *of each one of the questions you have answered.*

1 Give the common name, the preparations and the doses of hyoscyamus.

2 Give the treatment of pyrosis.

3 Give the common name, the botanic description and the specific uses of colocynth.

4 Give the specific indications for la grippe with high fever, pains and coryza.

5 State the source, the preparations and the doses of camphor.

6 Write a prescription for a child six months old, who is suffering from cholera infantum.

7 Describe buchu and give its preparations.

8 Describe *two* diseases producing polyuria.

9 Give the common name of baptisia and mention the parts employed in medicine. State the doses of baptisia.

10 Mention *three* important antithermic drugs and state how they cause heat reduction.

11 State the source, the preparations and the doses of turpentin.

12 Mention the specific indications of lycopus Virginicus.

13 Give the common name, the preparations and the uses of prunus Virginiana.

14 Give the specific treatment in phlegmonous erysipelas accompanied by high fever.

15 Give the preparations and the doses of yerba santa.

No.
Board
Place

## College Department

### 67th Medical Examination

## Therapeutics, Practice and Materia Medica

### Friday, January 27, 1905—9.15 a. m. to 12.15 p. m., only

". . . in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."

Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the **Eclectic Medical Society** of the State of New York.

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 What is a styptic? Mention *three* vegetable styptics.

2 Mention the specific indications in a case of albuminous urine with headache and vomiting.

3 Give the source and the uses of atropin.

4 Outline a non-mercurial treatment for the tertiary stage of syphilis.

5 What is potassium citrate? Give the common uses of potassium citrate.

6 Give the specific treatment of heat-stroke, when the patient has a high temperature and a bounding pulse.

7 State the composition and the uses of compound syrup of squill.

8 State the object and give the process of sterilization of milk.

9 Give the habitat and the botanic description of cactus grandiflorus.

10 Give the specific indications in a case of ascites from lesion of the liver.

11 What is aromatic sulfuric acid? Mention the specific indications for the use of aromatic sulfuric acid.

12 Give the treatment of poisoning by carbolic acid. What is the immediate cause of death in poisoning by carbolic acid?

13 Describe the black mustard plant and state its medicinal uses.

14 Mention some vasomotor depressant drugs and give the specific indications for their use.

15 Describe iris versicolor and give the specific indications for its use.

*University of the State of New York* No. 39

## College Department

Board

### 68th Medical Examination

Place

## Therapeutics, Practice and Materia Medica

**Friday,** May 19, 1905—9.15 a. m. to 12.15 p. m., only

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" . . . in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."

Laws of 1893, ch. 661 § 146

Questions prepared by the board of examiners representing the **Eclectic Medical Society** of the State of New York.

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Give the specific indications for the use of aconite. State the dose of the tincture and of the extract of aconite.

2 Describe the treatment of pneumonitis.

3 Give the treatment of typhoid fever.

4 Mention the preparations of opium.

5 When is belladonna specifically indicated?

6 Give the causes and treatment of jaundice.

7 Give the cause, symptoms and treatment of diphtheritis.

8 Give the treatment of a case of erysipelas.

9 Give the specific treatment of syphilis in the first stage.

10 Give the indications for the use of muriate of ammonia. State the dose of muriate of ammonia.

11 When should crataegus oxyacantha be used? State the dose of the fluid extract of crataegus oxyacantha.

12 Give the symptoms and treatment of urticaria.

13 What are the preparations and uses of serpentaria?

14 Give the medicinal treatment of a case of hemorrhoids.

15 Give the treatment of a case of hysteria.

No.

## College Department

Board

### 69th Medical Examination

Place

## Therapeutics, Practice and Materia Medica

### Friday, June 23, 1905—9.15 a. m. to 12.15 p. m., only

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> " . . . in therapeutics, practice and materia medica all the questions submitted to any candidate shall be chosen from those prepared by the board selected by that candidate, and shall be in harmony with the tenets of that school as determined by its state board of medical examiners."
>
> Laws of 1893, ch. 661, § 146

Questions prepared by the board of examiners representing the Eclectic Medical Society of the State of New York.

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Describe the symptoms and treatment of sciatica.

2 Give the causes and treatment of gout.

3 From what is atropin obtained? Describe the uses of atropin in medicine.

4 How is wine of colchicum seed prepared? Give its therapeutic uses.

5 Give the causes and treatment of tetanus.

6 State from what pepsin is obtained and give its uses in medicine.

7 Describe the therapeutic uses of bismuth subnitrate.

8 Give the therapeutic uses of gelsemium.

9 Give the preparations, the doses and the therapeutic uses of scoparius.

10 Give in detail the treatment of acute capillary bronchitis.

11 Give the therapeutic uses and the physiologic action of veratrum viride.

12 Give the cause, symptoms and treatment of acute coryza.

13 Describe malarial fever and give its treatment.

14 Give the symptoms and treatment of catarrhal jaundice.

15 Describe iritis and give its treatment.

*University of the State of New York*

No.

Place

## College Department

**43d Dental Examination**

# ANATOMY

**Tuesday,** September 27, 1904—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* no more. *Check the number (√) of each one of the questions you have answered.*

1 Bound the orbital cavity.

2 Describe the sphenomaxillary fissure.

3 Mention the bones that form the septum of the nose.

4 Describe the external surface of the greater wing of the sphenoid bone.

5 Describe the inferior maxillary bone.

6 Describe the aorta.

7 Mention the arteries given off from the transverse portion of the aorta.

8 Describe the superficial temporal artery.

9 Describe the lateral sinuses.

10 Describe the external jugular vein.

11 Describe the pyramidalis nasi muscle.

12 Describe the geniohyoid muscle.

13 Describe the nasal nerve.

14 Mention the branches of the inferior maxillary nerve.

15 What does the facial nerve supply?

*University of the State of New York*

No.

Place

## College Department

### 44th Dental Examination

## ANATOMY

**Tuesday,** January 24, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 State the origin and distribution of *each* of the following nerves: (*a*) optic, (*b*) olfactory, (*c*) pneumogastric.

2 Give the distribution of the glossopharyngeal nerve

3 Describe the Vidian nerve.

4 Name the cranial nerves.

5 Describe the sphenopalatine nerves.

6 Describe the frontal nerve.

7 Bound the sphenoidal fissure.

8 Bound the orbital cavity.

9 Describe the sphenoidal cells.

10 Describe the inferior maxillary bone.

11 Describe the action of the occipitofrontalis muscle.

12 Define extrinsic muscle of the tongue.

13 Describe the direction of the external carotid artery.

14 Name the branches of the facial artery.

15 Describe the blood supply of the lower teeth.

*University of the State of New York*

No.

Place

## College Department

### 45th Dental Examination

# ANATOMY

**Tuesday,** May 16, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Describe the nasal bone.

2 Bound the temporal fossa.

3 Describe the mastoid cells.

4 Mention the points of interest on the superior surface of the body of the sphenoid bone.

5 Describe the temporal vein.

6 Describe an involuntary muscle.

7 Describe a tendon.

8 Describe the orbicularis palpebrarum.

9 Name the muscles in the second layer of the tongue.

10 Describe the levator labii inferioris.

11 Name the muscles that depress the lower jaw.

12 Name the branches of the nasal nerve.

13 Give the function of the inferior maxillary nerve.

14 What arteries are given off from the ascending portion of the aorta?

15 Describe the left common carotid artery.

No.

Place

## College Department

### 46th Dental Examination

## ANATOMY

**Tuesday, June 20, 1905—9.15 a. m. to 12.15 p. m., only**

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*Answer any 10 of the questions on this paper but* no more. *Check the number (√) of each one of the questions you have answered.*

1 Describe the innominate artery.

2 Describe the superior thyroid artery.

3 Describe the blood supply of the upper teeth.

4 Name the divisions of the internal carotid artery.

5 Describe the internal jugular vein.

6 Describe the frontal vein.

7 Describe the cavernous sinus.

8 Give the deep origin of (*a*) the anterior root of the trifacial nerve, (*b*) the posterior root of the trifacial nerve.

9 What branch of the superior maxillary nerve is given off in the cranium?

10 Describe the nerve supply of the upper teeth.

11 Describe the ligament of Zinn.

12 Name the muscles inserted into the upper lip.

13 Describe the sternomastoid muscle.

14 Describe the superior maxillary bone and give its articulations.

15 Mention the points of interest on the cribriform plate of the ethmoid bone.

*University of the State of New York*

No. 45

Place

## College Department

### 43d Dental Examination

# PHYSIOLOGY AND HYGIENE

**Tuesday,** September 27, 1904—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Give a general description of the parotid gland and state its function.

2 Mention the conditions that (*a*) hasten the coagulation of blood, (*b*) retard the coagulation of blood.

3 State the general divisions and give the functions of the trifacial (trigeminal) nerve.

4 State the effect of the nervous system on digestion.

5 Mention the varieties and state the function of epithelium.

6 Describe the lymphatic system and state its function.

7 Describe the development and functions of teeth.

8 Give the nervous and the muscular mechanism of respiration. Where is the respiratory center located?

9 From a pure air standpoint, has any of the following methods of heating any advantage: (*a*) steam, (*b*) hot water, (*c*) hot air furnace, (*d*) open fire place? Explain.

10 State how a dental office may be kept in a sanitary condition and free from odor.

11 State the best method of disinfecting the sputum of a consumptive patient.

12 What constitutes (*a*) hard water, (*b*) soft water?

13 Mention the ferments of gastric juice and state the action of each ferment.

14 State the advantages, if any, of cremation over earth burial.

15 Define heart sounds.

No.

Place

## College Department

### 44th Dental Examination

# PHYSIOLOGY AND HYGIENE

**Tuesday,** January 24, 1905 — 1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 How and from what sources do the various tissues of the tooth derive their nourishment?

2 State the source of bile and give its functions.

3 State the source of saliva and give its functions.

4 State the action and reaction of (*a*) gastric juice, (*b*) pancreatic juice.

5 State the physiologic relations of the pneumogastric nerve to the stomach.

6 Give the cause of coagulation of blood. State how long after death blood coagulates in the body.

7 State the origin and functions of the trifacial (trigeminal) nerve.

8 State in full the composition and functions of blood.

9 State how milk may become a means of transmitting the germs of typhoid fever.

10 Name and locate the valves of the heart.

11 Name *six* kinds of food from which starch is derived.

12 Describe the organs of taste.

13 State the importance of the reflex action of the brain.

14 State and illustrate the functions of the nerve fibers.

15 Describe sewer gas. State the effects of sewer gas on the system if inhaled in large quantities.

*University of the State of New York*

No.

Place

## College Department

### 45th Dental Examination

# PHYSIOLOGY AND HYGIENE

Tuesday, May 16, 1905 — 1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* no more. *Check the number* (√) *of each one of the questions you have answered.*

1 Describe the sympathetic nervous system, giving its functions.

2 Describe the peridental membrane, touching specially on its blood and nerve supply. Give the functions of the peridental membrane.

3 Describe in detail the method by which the tissues of the body are nourished.

4 State the germ theory of disease.

5 State the order of eruption of the temporary and of the permanent teeth, giving in each case the age at which they appear.

6 Describe glycogen. Mention the function of glycogen and name the organ by which it is elaborated.

7 Describe the means to be employed in cleansing dental instruments.

8 Mention approximately the number of parts of carbon dioxid in 1000 parts of atmosphere. Give the maximum allowable limit of carbon dioxid in schoolrooms.

9 What hygienic measures should be adopted when filling proximal cavities?

10 State how the heart is nourished.

11 Describe the movements of the heart.

12 State (*a*) whether blood pressure is always present in man, (*b*) when blood pressure is the greatest.

13 State how iron is supplied to the system and where in the body it is found.

14 Give the conditions that favor the absorption of food.

15 Describe insalivation.

No.

Place

## College Department

### 46th Dental Examination

# PHYSIOLOGY AND HYGIENE

**Tuesday,** June 20, 1905 — 1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Describe the manner in which the nutrient products of digestion enter the circulation.

2 State the functions of (*a*) the brain, (*b*) the spinal cord.

3 Define system, apparatus, function.

4 Mention the changes that take place in the blood while it passes through the circulatory system.

5 Describe the action of the nervous system on the salivary glands.

6 Describe the structure and the function of (*a*) striated muscles, (*b*) nonstriated muscles. Which are called voluntary?

7 Describe the nervous mechanism of respiration.

8 Mention the manner in which the heart beat is influenced by the pneumogastric nerve. Give the average heart beat at the age of (*a*) 1 year, (*b*) 10 years, (*c*) 70 years.

9 Locate the dental periosteum and describe its structure.

10 Differentiate mucous membrane and serous membrane. Give the location and the functions of each.

11 Define protoplasm.

12 Describe epithelium and state its functions.

13 State the function of (*a*) plasma, (*b*) lymph, (*c*) chyle.

14 Describe (*a*) reflex action, (*b*) automatic action.

15 Differentiate organic substance and inorganic substance.

*University of the State of New York*

No.

Place

## College Department

### 43d Dental Examination

# CHEMISTRY AND METALLURGY

**Wednesday,** September 28, 1904—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* no more. *Check the number* (✓) *of each one of the questions you have answered.*

1 Define quantivalence. Give examples of univalent, bivalent, trivalent and quadrivalent elements.

2 State the physical properties, chemical composition, method of preparation and principal use of carborundum.

3 Give *three* tests for HCl and the chlorids.

4 Describe a method of preparing $AgNO_3$. Mention the common name, chemical properties and uses in dentistry of $AgNO_3$.

5 Mention the principal ore of tin and describe the process of extracting metallic tin from the ore mentioned.

6 Describe the flame test as used in analytical chemistry.

7 Describe the preparation of calcium sulfate for dental use and state the properties that it should possess.

8 Distinguish between a combustible and a supporter of combustion.

9 State the use of litmus in chemical analysis. How is red litmus paper prepared?

10 Explain *each* of the following: reflection of light, refraction of light, dispersion of light.

11 Define molecular weight. Give the molecular weight of *each* of the following: $AgNO_3$, $H_2SO_4$, NaCl.

12 Distinguish between a noble metal and a base metal.

13 Mention 10 important metals used in dentistry and give the symbol of each.

14 Give the atomic weight and the fusing point of argentum.

15 How may lead and zinc be removed from gold plate without dissolving the alloy?

**No.**

**Place**

## College Department

### 44th Dental Examination

# CHEMISTRY AND METALLURGY

**Wednesday,** January 25, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Mention the physical and the chemical properties of nitrogen. State the importance of nitrogen in (*a*) the free state, (*b*) organic compounds.

2 Describe the construction and explain the operation of the oxyhydrogen blowpipe.

3 What is ozone? Describe a method of preparing ozone.

4 Complete the following equations:

$MnO_2+4HCl=$

$K_2CO_3+Ca(OH)_2=$

5 Define *five* of the following: alloy, precipitate, amalgam, allotropism, reagent, isomerism, chemism.

6 State the source of bromin and the group of elements to which it belongs. Describe a method of preparing bromin.

7 Describe a method of preparing chloroform, writing the reaction or reactions.

8 Describe a process of preparing aluminum by reduction from one of its compounds.

9 State the source of *each* of the following acids: citric, acetic, lactic, salicylic, oxalic.

10 Write the chemical name of *each* of the following: muriatic acid, quicklime, salt, cinnabar, Epsom salts.

11 Convert 36° C. into the corresponding reading F.

12 State the products of the combustion of ordinary coal.

13 Describe some form of galvanic cell. State the chemical changes produced within this galvanic cell when in action.

14 Differentiate analysis and synthesis. Illustrate.

15 Write the formula of a standard three-metal alloy for amalgam fillings.

*University of the State of New York*

No.

## College Department

Place

### 45th Dental Examination

# CHEMISTRY AND METALLURGY

**Wednesday,** May 17, 1905—9.15 a. m. to 12.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Define *five* of the following: reaction, chemical occlusion, radical, element, atomic weight, disinfectant, valence.

2 Describe a method of preparing oxygen by the decomposition of potassium chlorate. Write the reaction.

3 Differentiate mechanical action and chemical action.

4 Describe the construction and the operation of the Bunsen burner.

5 How is sulfur found in nature? Describe a process of reducing sulfur from its ores.

6 Write the formula of *each* of the following: nitric acid, sodium carbonate, sulfuric acid, potassium chlorate, calcium sulfate.

7 Describe a method of preparing sulfuric ether. Mention the properties of sulfuric ether.

8 Complete the following equations:

$$BaO_2+CO_2+H_2O=$$

$$PI_3+3H_2O=$$

9 Describe *one* of the usual methods of preparing ammonia on a commercial scale.

10 What is a liter? What fraction of a meter is a millimeter?

11 What is a graphic formula? Give an example.

12 Describe the manufacture of illuminating gas.

13 Name the oxids of copper and give the formula of each oxid named.

14 Give the boiling point of (*a*) water, (*b*) alcohol, (*c*) mercury.

15 Write a formula for a 20 carat gold plate.

*University of the State of New York*

No.

## College Department

Place

### 46th Dental Examination

# CHEMISTRY AND METALLURGY

**Wednesday,** June 21, 1905—9.15 a. m. to 12.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Define *five* of the following: dibasic acid, metal, anhydrid, positive element, alkali, compound radical, triad.

2 Describe a method of preparing hydrogen other than by the decomposition of water, writing the reaction. Give the physical and the chemical properties of hydrogen.

3 Describe a method of preparing phosphoric acid. Mention a use of phosphoric acid in dentistry.

4 Describe the process of distillation.

5 Write the chemical name of *each* of the following: white lead, gypsum, calomel, copperas, blue vitriol.

6 Describe the usual method of preparing pure nitrous oxid, writing the reaction.

7 Name *three* important potassium salts. Give the formula and the medicinal properties of each of the salts named.

8 Differentiate a sulfite and a sulfate.

9 Define cupellation. Describe a process of extracting silver from its ores by cupellation.

10 Complete the following equations: $As_2O_3+3H_2S=$
$H_2SO_4+NaNO_3=$

11 State approximately the number of (*a*) inches in one meter, (*b*) grains in one gram.

12 Describe destructive distillation.

13 Give in regard to lead (*a*) its symbol, (*b*) its principal ore, (*c*) its physical properties, (*d*) its principal uses.

14 Write a formula for silver solder.

15 Differentiate chemical compound and mechanical mixture. Illustrate each.

*University of the State of New York* 53

No.

**College Department**

Place

**43d Dental Examination**

# ORAL SURGERY AND PATHOLOGY

**Wednesday,** September 28, 1904—1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 State where reflex pain is manifested when an upper wisdom tooth is affected with acute pulpitis.

2 Define pure culture. State how pure culture may be obtained.

3 Describe the treatment necessary for rapidly and completely healing the cavity of an abscess.

4 Describe the symptoms of syphilitic periostitis. Describe the pathologic processes that may occur in syphilitic periostitis.

5 State the method used to ascertain whether or not a pulp is exposed in deep cavities.

6 Mention and describe the varieties of deposit found on the human teeth.

7 Describe the forms of bandages used in the treatment of fractures of the inferior maxilla.

8 Give the diagnosis, the subjective symptoms and treatment of chronic purulent pulpitis.

9 Mention some of the diseases that may be mistaken for empyema of the maxillary sinus.

10 Mention the predisposing and the exciting causes of a multilocular cyst of the inferior maxilla. Give treatment.

11 State where the pain is usually located when the inferior maxillary division of the fifth nerve is affected.

12 State what is indicated in deep-seated cavities when the patient experiences no pain from the pressure with cotton.

13 State the time and the regular order of the normal eruption of deciduous teeth.

14 State the effect of an oxychlorid or an oxyphosphate filling on sensitive dentin.

15 State the effect on normal dentin of excavating with a bur or other instrument.

*University of the State of New York*

No.

## College Department

Place

**44th Dental Examination**

# ORAL SURGERY AND PATHOLOGY

**Wednesday,** January 25, 1905—1.15 to 4.15 p. m., only

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Give the etiology and pathology of osteosarcoma.

2 Give the symptoms and treatment of septicemia.

3 Give the causes, pathology and treatment of dry gangrene of the pulp.

4 State the local and the mechanical causes of marginal gingivitis. Give treatment.

5 Describe the pathologic effects of salivary calculus. Give prognosis and treatment.

6 State the age at which surgical treatment for cleft palate is performed. Give reasons.

7 Describe the formation of tubercular abscesses. Give the symptoms and treatment.

8 Give the anatomic division of hemorrhage.

9 Describe the treatment of an abscess following fracture of the inferior maxilla.

10 Give the classification of wounds. Give the treatment of *one* variety.

11 Define shock. Give the causes, symptoms and treatment of shock.

12 State the degree of temperature most favorable to the development of pathogenic bacteria.

13 Define hyperemia. Give the forms of hyperemia.

14 State where streptococcus pyogenes are commonly found.

15 Give the etiology and pathology of lardaceous degeneration.

No.

Place

**College Department**

**45th Dental Examination**

# ORAL SURGERY AND PATHOLOGY

**Wednesday,** May 17, 1905 — 1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered.*

1 Give the etiology, pathology and treatment of pulp nodules.

2 Name the different types of necrosis.

3 Give the symptoms and the treatment of pyemia.

4 Give the causes, pathology, symptoms and treatment of interstitial gingivitis.

5 Give the causes, pathology, symptoms and treatment of moist gangrene of the pulp.

6 Give the origin, varieties and treatment of serumal calculi.

7 Describe a method of uniting a cleft in the lip.

8 Give the symptoms and the prognosis of a cold abscess.

9 Describe the methods of arresting hemorrhage.

10 What is indicated by a rise of body temperature during the treatment of a fracture of the inferior maxilla? Give treatment.

11 Describe the process of repair of tissue.

12 Define collapse and give its symptoms and treatment.

13 Define sterilization, disinfection.

14 Describe (*a*) mechanical irritants, (*b*) chemical irritants, (*c*) septic irritants.

15 What is understood by the term bacteria?

55

*University of the State of New York*

No.

## College Department

Place

### 46th Dental Examination

# ORAL SURGERY AND PATHOLOGY

**Wednesday,** June 21, 1905—1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 Define necrosis. Give the causes, symptoms and treatment of necrosis.

2 Describe a test for pulp validity.

3 Define gingivitis. Give the causes, pathology and treatment of gingivitis.

4 Give the causes, pathology and treatment of subgingival calculus.

5 Define staphylorrhaphy, chiloplasty.

6 Give the clinical history of tuberculosis of the inferior maxilla.

7 Give the causes and the treatment of primary and secondary hemorrhages.

8 Describe *two* forms of interdental splints.

9 How is infective inflammation produced?

10 Give the treatment of shock and collapse resulting from severe hemorrhage.

11 Give the etiology of secondary dentin.

12 Give the etiology, pathology and treatment of calcific degeneration of the pulp.

13 Describe mixed infection.

14 Give the local and the constitutional symptoms of alveolar abscess.

15 Give the etiology, symptoms and treatment of rickets.

*University of the State of New York* No. 57

College Department Place

43d Dental Examination

## OPERATIVE DENTISTRY

Thursday, September 29, 1904—9.15 a. m. to 12.15 p. m., only

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Mention the recognized stages of dental caries. Describe the operation and treatment of superficial caries.

2 Give conservative treatment of an exposed pulp in a deciduous tooth.

3 What is the conservative treatment of an exposed pulp in a six year molar? Give reasons.

4 Under what conditions should the deciduous teeth be extracted?

5 Mention conditions that require the lancing of gums over erupting deciduous teeth.

6 When is it advisable to extract a six year molar? Give reasons.

7 Mention the characteristics of amalgam that render it a favorite material for filling teeth.

8 In what respects is amalgam superior to other plastic filling materials?

9 Describe the characteristics of amalgam and give the method of condensing it in a cavity so that there may result the least change of form or shrinkage in crystallization.

10 State the most successful method of filling with gold a poorly organized, frail tooth.

11 Describe the method of removing pulps by pressure anesthesia.

12 What is the operation "extension for prevention"? How and why is it performed?

13 Describe a method of filling a molar tooth having only the buccal and lingual walls remaining, to prevent fracture of the walls in mastication.

14 Give the cause and treatment of hypersensitive dentin.

15 Diagnose blind abscess and give the operation and treatment required for its relief.

No.

Place

## College Department

### 44th Dental Examination

# OPERATIVE DENTISTRY

**Thursday, January 26, 1905—9.15 a. m. to 12.15 p. m., only**

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 Describe the instruments used for preparing the walls of a cavity for a gold filling.

2 State the manner of protecting and securely holding, while filling, a tooth that has been wedged for space.

3 Differentiate cohesive and noncohesive gold manipulation in filling a cavity.

4 State the action of remedies in relieving sensitiveness and sterilizing dentin while a cavity is being prepared for filling.

5 State the preferable medicament for rendering a cavity aseptic and obtunding sensitiveness.

6 Describe a reliable treatment for the preparation of pulp canals for filling.

7 State a safe method of adjusting a cap on an exposed pulp.

8 Describe the treatment of a third inferior molar when the crown is normal, the pulp exposed at the distal gingival border and the tooth painful.

9 Describe the mummification of a pulp, giving technic and advantages.

10 Describe the treatment and filling of an approximal cavity of a bicuspid, extending from the gum line to occlusal enamel

11 Describe the reasons for the discoloration of the crown when the pulp dies and remains in the tooth. Give treatment of such teeth.

12 State the reason for the change in the color of teeth when the pulps are devitalized and immediately removed.

13 Describe the remedies used and give the treatment for restoring most effectually the natural color of the teeth referred to in question 12.

14 State the reasons why various metals mechanically combined in a filling check decay or waste in the tooth where gold alone fails.

15 Describe deep seated caries and give treatment.

*University of the State of New York* No. 59

## College Department

Place

### 45th Dental Examination

# OPERATIVE DENTISTRY

**Thursday,** May 18, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 How should decay on the distal approximal surfaces of deciduous molars in a child six or seven years of age be treated to protect the six year molars?

2 Why is the retention of the deciduous teeth till the eruption of the permanent teeth important?

3 Give the cause of green stain on children's teeth and state why such deposits should be thoroughly removed.

4 Give treatment of a six year molar with the pulp exposed, prior to the eruption of a twelve year molar.

5 Describe the treatment of the mouth and teeth to relieve sensitivity at the gingival margin.

6 Describe hypersensitive dentin and give treatment.

7 Describe the advantages that sometimes accompany combination fillings of gold and amalgam.

8 State the reason for sensitivity of the teeth to thermal changes in many cases immediately after filling. Describe method of avoiding this condition.

9 Describe the introduction of soft gold fillings and the forms of plugger points used, giving method of filling and finishing.

10 State the reason for the popularity of tin for filling extremely sensitive teeth, giving method of use.

11 State why zinc phosphate fillings are often used with advantage in saving poorly organized, sensitive teeth.

12 Name the preferable material for fillings in very sensitive cavities at the labial gingival margin. Justify your choice.

13 State why cylinders of gold are so popular for fillings in certain classes of cavities.

14 Describe the treatment of an inferior third molar with many sulci radiating from central cavity.

15 Give the advantages of the use of the matrix in filling teeth with gold. Mention the objections to its use.

No.

Place

## College Department

### 46th Dental Examination

# OPERATIVE DENTISTRY

Thursday, June 22, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 Describe a method of filling root canals, giving technic of operation and mentioning materials used. Give reasons for the use of these materials.

2 Describe a method of filling a root canal having a large foramen at the apex of the root, so as to prevent the forcing of the filling through into the socket.

3 Describe the advantages of porcelain fillings. Give details of the insertion of such fillings.

4 Give the reasons for exercising great care when separating the teeth of children by wedging.

5 Describe a safe method of devitalizing a pulp when the cavity is situated below the gum margin.

6 Describe the preparation, for a soft gold filling, of a distal approximal cavity in an incisor.

7 Mention the form of matrix advantageously used in inserting an approximal gold filling in an incisor. Describe the condition of the tooth that renders the use of the matrix desirable.

8 Give the treatment of pericementitis in a tooth that has a perfect filling in the nerve canal.

9 Describe in detail the local treatment of pyorrhea alveolaris.

10 Mention the conditions that indicate constitutional treatment as an aid to local treatment in pyorrhea alveolaris. Name remedies employed in the constitutional treatment.

11 Mention the conditions that indicate a combination of gold and cement to restore the usefulness of a tooth.

12 Describe the operation of preparing a cavity and filling it with tin foil.

13 Describe the injury done to the soft tissues and sockets of teeth by wedging for space.

14 Describe the introduction and finishing of an approximal contour gold filling.

15 Describe the pathologic condition that may result from the devitalizing of pulps with arsenic.

*University of the State of New York*

No.

**College Department**

Place

**43d Dental Examination**

## PROSTHETIC DENTISTRY

**Thursday,** September 29, 1904—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Mention *four* conditions necessary for the successful soldering of two pieces of gold.

2 Describe the method of properly trimming the backing and of disposing of the pins, in a case made of single gum teeth.

3 State the elements in the compound "purple of Cassius."

4 Describe the Matteson lingual bow and give method of attachment for moving the upper central incisors forward.

5 Describe an occipital appliance and yoke used for retracting and shortening the upper central incisors.

6 Describe a lingual bow and hook band and explain its application for rotating an upper central incisor.

7 Of what value is kaolin in porcelain bodies?

8 What frit is used to produce porcelain gum enamel?

9 How does the knowledge of temperamental characteristics assist in the selection of teeth?

10 Mention some of the difficulties encountered in securing a correct bite.

11 Should the shape of an upper impression be changed? Explain why and how this change should be made.

12 Describe in detail the process of making a very thin, dense and tough plate of vulcanite.

13 Describe the method of constructing and attaching a porcelain bridge (lower second bicuspid and first molar) without crowning or capping the adjoining teeth.

14 Describe the Condit retainer for artificial dentures.

15 Describe an obturator and artificial velum combined for a complete cleft-palate.

No.

Place

## College Department

### 44th Dental Examination

# PROSTHETIC DENTISTRY

**Thursday,** January 26, 1905 — 1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 State some of the changes in position, form and color of the teeth, that occur in a natural denture with advancing years.

2 State the principal points to be observed in selecting and arranging a set of artificial teeth for an edentulous mouth.

3 State some objections to the use of the ordinary articulator

4 Describe in detail the method of making a lower denture by the cheoplastic process.

5 Describe the method of obtaining a correct occlusion with the opposing tooth or teeth in making and setting a gold molar crown.

6 Give the treatment of a badly decayed root by which it may be made sufficiently strong to carry safely a dowel or pin crown.

7 State some conditions in the mouth that contraindicate the use of a fixed bridge.

8 Describe the bridge support devised by Dr J. P. Carmichael of Milwaukee.

9 Describe the treatment of a case of prognathism.

10 Describe the condition of the teeth and the appearance of the roof of the mouth in a case of chronic adenoid hypertrophy in the nasopharynx.

11 Describe the Magill band and its method of attachment.

12 State the six directions in which the various teeth may be moved in adjusting irregularities.

13 State what two metals in combination would make a good clasp for a partial lower continuous gum case.

14 Give the reasons for the warping of gold or silver plates during the process of soldering. State a means of prevention.

15 Describe the Kingsley artificial velum.

*University of the State of New York* No. 63

Place

## College Department

### 45th Dental Examination

## PROSTHETIC DENTISTRY

**Thursday,** May 18, 1905 — 1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Give the relative merits of metal and rubber for base plates for artificial teeth.

2 Mention the function of silica as a constituent of porcelain body.

3 Give a practicable method of rendering the teeth useful and comfortable, when, by mechanical abrasion, the six upper anterior teeth have been worn to the pulp, the remaining labial wall of enamel being left intact, and the back teeth are either worn down or missing.

4 Give a method of making and of setting a fixed bridge to take the place of the four lower incisors, and of attaching it to the cuspid teeth without cutting them off or exposing any gold.

5 Give the correct occlusion of the upper and the lower first permanent molars.

6 For various reasons in regulating cases it is sometimes desirable to obtain a plaster model of the face. Describe the process necessary to secure it.

7 Describe a facial goniometer and explain its use.

8 Describe the process of putting a facing of Jenkins porcelain in a gold bicuspid cap crown.

9 Outline the back edge of an upper plate, showing its proper relation to the palate and to the maxillary tuberosities.

10 In articulating a full denture what teeth should bear the greatest pressure of the bite?

11 In prosthetic dentistry what is meant by "reposing the features"? How may this result be accomplished?

12 What relation in regard to length should (*a*) the upper teeth bear to the upper lip, (*b*) the lower teeth bear to the lower lip?

13 How may the proper time to remove a plaster impression from the mouth be decided?

14 In the construction and adaptation of bridgework, mention some of the precautions necessary to retain a hygienic condition in the mouth of the wearer.

15 Describe the method of making an open faced cuspid gold crown.

No.

Place

## College Department

### 46th Dental Examination

# PROSTHETIC DENTISTRY

**Thursday, June 22, 1905 — 1.15 to 4.15 p. m., only**

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 In a base plate for artificial dentures what requirements are essential to hygiene?

2 Differentiate the terms articulation and occlusion.

3 In a molar and bicuspid bridge how may a perfect occlusion with the opposing teeth be secured?

4 Describe the basal appliance used in the Dr Jackson system of regulating.

5 What ingredient in the porcelain body of artificial teeth gives the power of withstanding the great heat necessary in soldering?

6 Describe a simple but accurate method of securing a profile record of the face in regulating cases.

7 In regulating cases it is sometimes desirable to know the exact position of unerupted teeth or the position of roots of teeth already erupted; how may this knowledge be obtained?

8 What constitutes the basis of prosthetic dentistry?

9 In annealing aluminum what two ways are there of determining the proper temperature?

10 Describe the Justi removable pin crown.

11 Describe the Stedman dental spring used to retain a full denture in position.

12 Describe in detail the construction and the adjustment of a removable porcelain bridge (upper incisors and cuspids) attached to the cuspid roots. How should the roots be protected from the danger of decay?

13 What are the four requisites to successful soldering?

14 Mention the cells that are active in filling in bone in the space made by moving a tooth.

15 In regulating the teeth state the requirements of an anchor tooth.

No.

Place

## College Department

### 43d Dental Examination

# THERAPEUTICS AND MATERIA MEDICA

**Friday,** September 30, 1904—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* no more. *Check the number* (✓) *of each one of the questions you have answered.*

1 Define tincture, fluid extract, emulsion.

2 What is an alkaloid? Mention *one* class of substances with which alkaloids are chemically incompatible.

3 What conditions determine whether local anesthesia or general anesthesia shall be used?

4 Describe the method of inducing ether anesthesia. Mention the contraindications of ether anesthesia.

5 State the action of chloroform on the vital organs.

6 What are the requisites of a dentifrice? Mention *four* constituents of a good dentifrice and state the properties of each.

7 Write a prescription for an astringent mouth wash, using no proprietary terms.

8 What medicines, local and constitutional, are useful in the treatment of pericementitis?

9 Mention *three* caustic alkalis.

10 To what chemical affinity is due the caustic action of (*a*) sulfuric acid, (*b*) sodium, (*c*) potassium?

11 Give the treatment of local arsenical poisoning.

12 State the dental uses of carbolic acid. Give the symptoms and treatment of carbolic acid poisoning.

13 Mention the conditions that are to be antagonized in the treatment of cocain poisoning and state the best means for this purpose.

14 Mention *two* agents useful in bleaching teeth and describe the method of their application.

15 From what is strychnin obtained? State the dose of sulfate of strychnin.

No.

Place

## College Department

### 44th Dental Examination

# THERAPEUTICS AND MATERIA MEDICA

**Friday, January 27, 1905—9.15 a.m. to 12.15 p. m., only**

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Describe adrenalin. State the physiologic action and the therapeutic effect of adrenalin.

2 Name the remedies employed in the treatment of pyorrhea alveolaris.

3 Describe the physiologic action and the therapeutic effect of (*a*) heat, (*b*) cold.

4 State the dental uses of (*a*) morphin, (*b*) chloroform.

5 Describe the medicinal properties and the therapeutic effects of tannic acid.

6 Define nitrous oxid and describe its preparation.

7 State the conditions that contraindicate the use of nitrous oxid.

8 Describe *two* methods of local anesthesia.

9 Write a prescription containing *three* ingredients for pyorrhea alveolaris.

10 Mention *four* counter irritants.

11 Describe the action of arsenious acid on the tooth pulp and gums.

12 Define escharotic, emetic, cathartic.

13 Name *three* agents employed in bleaching teeth.

14 Describe the physiologic action and effect of cocain.

15 Define hemorrhagic diathesis.

*University of the State of New York*

No.

College Department

Place

45th Dental Examination

# THERAPEUTICS AND MATERIA MEDICA

**Friday,** May 19, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Differentiate the physiologic action, the physiologic effect and the therapeutic effect of a remedy.

2 Define creosote. State (*a*) its physiologic effect, (*b*) its dental uses.

3 Give the uses of adrenalin. State from what it is derived.

4 Define demulcent, detergent, analgesic

5 Differentiate conditions in which treatment by heat or cold would be indicated.

6 Give the dental uses of iodin. Mention the physiologic action and the therapeutic effect of iodin.

7 Name the remedies used to sterilize root canals.

8 Define counter irritant. Name *three* counter irritants.

9 Differentiate the physiologic effects of the following administered by inhalation: (*a*) nitrous oxid, (*b*) ether, (*c*) chloroform.

10 Explain auto-intoxication in anesthesia.

11 Mention the advantages of hypodermic administration of medicines.

12 Define cocain. Give the symptoms of cocain poisoning.

13 Name *two* agents employed with cocain. What is the object of the use of these agents?

14 Name a remedy for hemorrhagic diathesis. Mention the physiologic action and the dose of the remedy named.

15 Write a prescription containing *three* ingredients suitable for inflamed gums and mucous membrane.

No.

Place

## College Department

**46th Dental Examination**

# THERAPEUTICS AND MATERIA MEDICA

**Friday,** June 23, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Differentiate a formula and a prescription.

2 Name the principal alkaloids of (*a*) cinchona, (*b*) opium, (*c*) nux vomica.

3 State the dental uses of iron preparations.

4 Define astringent, depletive, hemostatic.

5 Differentiate carbolic acid and creosote.

6 Give the derivation and the uses of tannic acid.

7 Name the remedies employed in case of abnormal first dentition.

8 Describe the medicinal properties and the action of aconite.

9 Name the remedies employed in pericementitis.

10 Write a prescription containing *four* ingredients for empyema of the antrum.

11 Define asepsis.

12 Mention the dangers attending hypodermic injections.

13 Mention the conditions that would contraindicate the use of (*a*) chloroform as an anesthetic, (*b*) ether as an anesthetic.

14 Name a substitute for cocain. State why a substitute is used.

15 Describe *two* methods of artificial respiration.

*University of the State of New York*

No.

Place

## College Department

43d Dental Examination

# HISTOLOGY

**Friday,** September 30, 1904—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Define interglobular spaces.

2 Name and describe the coats of the stomach.

3 Mention the elementary tissues that are developed from the mesoderm.

**In the questions selected from the following group describe**

4 The manner in which nerve fibers terminate.

5 The axis-cylinder.

6 The appearance and arrangement of stratified epithelium as seen under the microscope.

7 The membranes that support the epithelium.

8 The different varieties of bone.

9 The subendothelial fibrous tissue of arteries.

10 The digestive tract.

11 The gross appearance of the right upper second bicuspid.

12 The submaxillary gland.

13 The pericementum.

14 The dentinal canals.

15 The peridental membrane.

No.

Place

## College Department

### 44th Dental Examination

## HISTOLOGY

**Friday,** January 27, 1905 — 1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Describe fibrous tissue cells.

2 How are bone corpuscles nourished?

3 What are osteoblasts?

4 Describe Peyer's patches.

5 Name the essential parts of a cell.

6 Name the varieties of cartilage.

7 Describe the neurilemma.

8 Describe the taste buds of the tongue.

9 Describe the development of nerve fiber.

10 Describe the composition of the cardiac muscular tissue.

11 Describe the interglobular spaces.

12 Of what is dentin composed?

13 Describe the Haversian canals.

14 Name the principal forms in which connective tissue occurs.

15 Describe the structure of a tendon.

*University of the State of New York*

No.

Place

## College Department

### 45th Dental Examination

# HISTOLOGY

Friday, May 19, 1905 — 1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 Describe the fibers that compose the intercellular substance.
2 Describe bone corpuscles.
3 What are osteoclasts?
4 Describe the mucous membrane of the oral cavity.
5 Describe the axis cylinder.
6 Describe the structure of smooth muscular tissue.
7 Of what is enamel composed?
8 Describe the structure of an artery.
9 Describe the mucous membrane of the tongue.
10 Name the varieties of cartilage.
11 Describe the spleen.
12 Describe the cells of reticular tissue.
13 Describe the development of the nerve cells.
14 Define metabolism.
15 Describe the primary blastodermic layers.

*University of the State of New York*

No.

Place

## College Department

### 46th Dental Examination

## HISTOLOGY

**Friday,** June 23, 1905 — 1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered.*

1 Define growth.
2 Describe the splenic pulp.
3 Describe the endothelium.
4 Describe the development of cartilage.
5 Describe the structure of capillaries.
6 Describe the colorless blood cells.
7 Describe the development of the nerve tissue.
8 What tissues are derived from the mesoderm?
9 Describe the structure of striated muscular tissue.
10 Describe the cells of adipose tissue.
11 Describe the development of dentin.
12 What are the Malpighian corpuscles of the spleen?
13 Describe the canaliculi.
14 Describe the sarcolemma.
15 Describe the kidney.

*University of the State of New York* 73

No.

Place

## College Department

### 38th Veterinary Examination

## ANATOMY

**Tuesday,** September 27, 1904—9.15 a. m. to 12.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Name the salivary glands. Describe the parotid gland.

2 Name the bones of the hock. Describe the os calcis.

**In the questions selected from the following group describe**

3 The Eustachian tube and the guttural pouches.

4 The nasal cavities.

5 The pedal bone.

6 The metacarpal bones.

7 The soft palate.

8 The olfactory apparatus, giving the origin and distribution of the nerves that supply it.

9 The coxofemoral articulation.

10 The atlo-axoid articulation.

11 The coffin joint.

12 The serratus magnus.

13 The triceps extensor brachii.

14 The kidneys.

15 The uterus of the cow.

No.

Place

## College Department

### 39th Veterinary Examination

## ANATOMY

**Tuesday,** January 24, 1905—9.15 a. m. to 12.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Mention the divisions of the intestinal tract. Describe (*a*) the double (fixed) colon, (*b*) the single (floating) colon.

2 Mention the muscles of the eyeball.

3 Mention the muscles and the other important structures that would be severed in amputating a horse's tail about eight inches from its base.

**In the questions selected from the following group describe**

4 The esophagus.

5 The stomach of the ox.

6 The membrana nictitans.

7 The peroneus.

8 The semimembranosus.

9 The lateral fibrocartilages.

10 The xiphoid appendage.

11 The keratogenous apparatus of the foot.

12 The sternum.

13 A dorsal vertebra.

14 The radius.

15 The os coronae.

*University of the State of New York*

No.

Place

## College Department

### 40th Veterinary Examination

## ANATOMY

**Tuesday,** May 16, 1905—9.15 a. m. to 12.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Name the bones of the carpus (knee). Describe the metacarpal bones.

2 Name the muscles of the superior cervical region. Describe the rhomboideus.

3 Name the muscles of the antebrachial region. Describe the extensor pedis.

4 Name the salivary glands. Describe the parotid gland.

5 Name the membranes that cover the brain and the spinal cord. Describe the arachnoid membrane.

6 Name the coats of the eyeball. Describe the cornea.

**In the questions selected from the following group describe**

7 A dorsal vertebra.

8 The temporomaxillary articulation.

9 The humeroradial articulation.

10 The stomach.

11 The esophagus.

12 The trachea and larger bronchi.

13 The posterior aorta.

14 The jugular vein.

15 The first pair of cranial nerves.

No.

Place

## College Department

### 41st Veterinary Examination

## ANATOMY

**Tuesday, June 20, 1905—9.15 a. m. to 12.15 p. m., only**

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Describe the pedal bone.

2 Describe the sternum.

3 Name the bones of the pelvis. Describe the cotyloid cavity.

4 Describe the fetlock joint.

5 Describe the larynx and give its nerve supply.

6 Name and describe the different kinds of articulations.

7 Describe the gastrocnemius.

8 Describe the testicles.

9 Name the principal lymphatic glands and give their location.

10 Describe the pulmonary circulation.

11 Describe the uterus of the cow.

12 Trace the course of the blood from the left ventricle of the heart to the right hind foot, naming in regular order all the important vessels through which the blood passes.

13 Describe a molar tooth.

14 Describe the tongue and give its nerve supply.

15 Describe the soft palate.

*University of the State of New York*

No. 77

Place

**College Department**

**38th Veterinary Examination**

## PHYSIOLOGY AND HYGIENE

**Tuesday,** September 27, 1904—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Name the elementary tissues of the body.

2 Give the circulation of the blood in (*a*) the fetus, (*b*) the adult.

3 Describe the anastomosis of the arterial and the venous circulation.

4 Give the mechanism of respiration.

5 Give the organs and tissues of secretion.

6 Give the organs and tissues of excretion.

7 Give the essentials of digestion.

8 Give the function or functions of (*a*) nerve fiber, (*b*) nerve center, (*c*) spinal nerve root, (*d*) medulla oblongata.

9 Mention the nerves, stating origin of each, that respond to the sense of taste, smell, hearing and sight.

10 Give the distribution and function of the vagus (10th cranial nerve).

11 Indicate by diagram a cross section of the eyeball.

12 Give the functions of the spleen.

13 Give all the vital organs.

14 Are bovine and human tuberculosis identical? Give reasons for answer.

15 Give in detail the functions of the liver.

*University of the State of New York*

No.

Place

## College Department

### 39th Veterinary Examination

# PHYSIOLOGY AND HYGIENE

**Tuesday,** January 24, 1905—1.15 to 4.15 p. m., only

---

*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Define blood. State in full the composition and the functions of blood.

2 Give a general description of the construction of a dairy stable, including a description of the best way to light and ventilate it.

3 State the differential features of digestion in the horse and the ox.

4 Give per cent of excretion of water from (*a*) the alimentary canal (feces), (*b*) the lungs (vaporous gases), (*c*) the skin (perspiration), (*d*) the kidneys (urine).

5 What means should be employed to eradicate tuberculosis among cattle?

6 State the functions of the sympathetic nervous system.

7 Is the stomach a vital organ? Explain.

8 Differentiate arterial circulation and venous circulation.

9 Give the normal temperature of (*a*) the horse, (*b*) the ox, (*c*) the dog, (*d*) the sheep, (*e*) the pig.

10 Give the composition of cow's milk. Explain the process of the secretion of cow's milk.

11 Write an order giving the precautions necessary for public safety in an outbreak of rabies.

12 What three sorts of impressions are obtained through the cutaneous nerves?

13 Explain the physiologic effect of injecting a solution of sodium chlorid into the circulation immediately after loss of blood.

14 What pathologic conditions are inheritable?

15 Mention the glands of the intestinal canal and state their function.

*University of the State of New York*

No.

## College Department

Place

### 40th Veterinary Examination

# PHYSIOLOGY AND HYGIENE

**Tuesday,** May 16, 1905 — 1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 What would result from bisecting (*a*) the anterior root of a spinal nerve, (*b*) the posterior root of a spinal nerve?

2 In what way would loss of function of the skin affect (*a*) the kidneys, (*b*) the lungs?

3 State the action of the gastric juice on fats and carbohydrates.

4 Mention the sources of fats and other solids in milk. Give a general outline of the secretion of milk.

5 Define nutrition and give an outline of the process, touching on (*a*) digestion, (*b*) absorption, (*c*) circulation, (*d*) assimilation, (*e*) excretion.

6 Give the mechanism of respiration. Name the muscles employed in respiration.

7 Give an account of the development of the alveolar process. Indicate by diagram a cross section of a permanent molar.

8 Differentiate mucous membrane and serous membrane, stating where each is found and giving the function of each.

9 Define perspiration and give an account of its physiologic uses.

10 Give an account of the uses of bile and name its active principle.

11 Discuss (*a*) the transmission of bovine diseases to man through dairy products, (*b*) the transmission of human diseases to man through milk. Name important diseases of each of the above classes.

12 Indicate by diagram a cross section of the medulla oblongata, naming each part of the organ bisected and giving the function of each part.

13 State the differential features of digestion in the sheep and in the pig.

14 Mention the chief function of *each* of the following cranial nerves: (*a*) first, (*b*) third, (*c*) fifth, (*d*) seventh, (*c*) ninth.

15 What hygienic measures should be employed to check the spread of infectious abortion in cattle?

*University of the State of New York*

No.

Place

## College Department

### 41st Veterinary Examination

## PHYSIOLOGY AND HYGIENE

Tuesday, June 20, 1905—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 State fully the function of the periosteum.

2 Name the varieties of muscular tissue and describe the action of each.

3 Of what value is oxygen to the animal body?

4 Describe the sounds of the heart and give the cause of each.

5 What are the lacteals? Give their function.

6 Define blood coagulation. Under what conditions does blood coagulate?

7 Define secretion, excretion. Illustrate each.

8 Illustrate by diagram a cross section of the kidney of (*a*) the horse, (*b*) the ox.

9 By what means does the blood absorb oxygen from inspired air?

10 Name the nerves that are implicated in the following: roaring, periodic ophthalmia, bone spavin, splint, navicular arthritis.

11 What are (*a*) proteids, (*b*) albuminoids?

12 Define coordination, inhibition, automatism.

13 Name the gastric ferments and give the action of each.

14 Name in regard to *each* of the following animals diseases that would subject it to quarantine: horse, cow, sheep, dog, pig.

15 Define contagion, infection. Give an illustration of each.

*University of the State of New York*

No.

Place

## College Department

### 38th Veterinary Examination

# CHEMISTRY

**Wednesday,** September 28, 1904—9.15 a. m. to 12.15 p. m., only

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***Answer any 10 of the questions on this paper but* no more. *Check the number (✓) of each one of the questions you have answered.***

1 State which, under similar conditions, will occupy the more space, 75 molecules of hydrogen or 75 molecules of nitrogen.

2 Find the molecular weight of a vapor that is 25 times as heavy as an equal volume of hydrogen at the same temperature and pressure.

3 How many grams of nitrogen can be combined with 9 grams of hydrogen to form $NH_3$? Find the weight of the $NH_3$ produced.

4 Calculate the percentage composition of $HNO_3$.

5 State what takes place when Na is placed in $H_2O$.

6 How does the action of $HNO_3$ on Cu differ from a simple solution?

7 Write the formula of *each* of the following: potassium sulfite, hydrogen potassium sulfite, calcium sulfite, hydrogen calcium sulfite.

8 State how the presence of lead may be detected in potable water.

9 When hydrogen and oxygen are combined in the proportion of two volumes of the former to one of the latter, what change takes place?

10 Write the formula of potassium cyanid. Mention the properties of potassium cyanid.

11 What is an alkaloid? State the properties of an alkaloid. Mention *three* alkaloids.

12 Change (*a*) 70° above zero C. into the corresponding reading F., (*b*) 101° above zero F. into the corresponding reading C.

13 What is nitroglycerin? State the properties of nitroglycerin.

14 What is an aldehyde? Mention the properties of an aldehyde.

15 State the peculiar difference between an oil of the paraffin series and an essential oil.

No.

Place

## College Department

### 39th Veterinary Examination

## CHEMISTRY

**Wednesday,** January 25, 1905 — 9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Define atom, molecule, mass.

2 What is marsh gas? In what proportion must marsh gas and oxygen be mixed in order to produce an explosive mixture containing no excess of either gas?

3 Describe a process for detecting the presence of bile in urine.

4 Describe a method of preparing hydrogen. State the properties of hydrogen.

5 Give the formula and properties of (*a*) corrosive sublimate, (*b*) calomel.

6 What is an alkaloid? Give the general characteristics of the vegetable alkaloids.

7 What is a carbohydrate? Mention carbohydrates that are common food for horses and cattle.

8 Define a double salt and give an example.

9 How does sulfur occur in nature? Describe a method of obtaining pure sulfur. State the action of heat on sulfur.

10 State the physical and the chemical characteristics of a metal.

11 Complete the following equation:

$$2NH_4Cl + H_2SO_4 =$$

12 What is the difference between a nitrite and a nitrate? Give the formula of nitrate of soda.

13 Find how many grams of $KClO_3$ must be used to prepare 55⅛ liters of O. [Atomic weight of K=39; 1 g. of O=.69751.]

14 Distinguish between synthesis and analysis. Give an example of each.

15 State the natural occurrence and the uses of sodium chlorid.

*University of the State of New York*

No.

Place

## College Department

### 40th Veterinary Examination

# CHEMISTRY

**Wednesday,** May 17, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered.*

1 Describe an experiment to prove that oxygen is a constituent of air.

2 Define crith.

3 Find the weight of one cubic meter of nitrogen.

4 Describe a method of distinguishing between oxygen and hydrogen.

5 Find how many grams of oxygen can be prepared from 10 grams of $KClO_3$. If the resulting oxygen were changed to ozone, what would be the weight of the ozone?

6 If 20 grams of H are exploded with O, what is (*a*) the number of grams of O required, (*b*) the weight of the resulting gas?

7 Find the percentage composition of $H_2SO_4$.

8 Give *two* of the most important physical properties of H and *two* of its distinctive chemical properties.

9 What analogies exist among the elements of the halogen group?

10 Find the percentage composition of marsh gas.

11 Write the chemical formula of dextrin.

12 Write the graphic formula of $H_3\overset{III}{P}O_3$.

13 Mention the characteristic properties of carbon.

14 Write the reaction for the preparation of chlorin.

15 Write the chemical formula of caustic potash.

No.

Place

## College Department

### 41st Veterinary Examination

## CHEMISTRY

**Wednesday, June 21, 1905 — 9.15 a. m. to 12.15 p. m., only**

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered.*

1 Give an outline of the atomic theory.

2 Define molecule. What is meant by the molecular weight of a substance?

3 State Avogadro's law.

4 State Dulong and Petit's law.

5 Name *four* acids used in dentistry and give the formula of each.

6 Define ozone. Describe a method of preparing (*a*) ozone from oxygen, (*b*) oxygen from ozone.

7 Give the chemical properties of peroxid of hydrogen. Describe a method of preparing peroxid of hydrogen.

8 Give the physical properties of peroxid of nitrogen. Describe a method of preparing peroxid of nitrogen.

9 Explain the bleaching action of chlorin in the presence of moisture.

10 Write the formula of sulfureted hydrogen. Describe a method of preparing sulfureted hydrogen.

11 Compare the properties of silicon with those of carbon. Define glass chemically.

12 What is alcoholic fermentation? Under what conditions does it occur?

13 Describe a process of extracting volatile oils from plants. Give examples of volatile oils.

14 Give the general composition of albuminous substances.

15 Name the most important kinds of sugar.

*University of the State of New York*

No.

Place

## College Department

### 38th Veterinary Examination

# SURGERY

**Wednesday,** September 28, 1904—1.15 to 4.15 p. m., only

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Define ptyalism, gleet, strabismus, epistaxis, tenesmus.

2 Give the causes, symptoms and treatment of glossitis.

3 What is goiter? Give the causes, symptoms and treatment of goiter in the horse and the dog.

4 Give the causes, symptoms and treatment of postpharyngeal abscess.

5 Give the causes, symptoms and treatment of subcutaneous emphysema.

6 Give the causes, symptoms and surgical treatment of hydrothorax.

7 Give the causes, symptoms, prognosis and treatment of ascites in the dog.

8 Define phimosis, paraphimosis. Give the symptoms and treatment of each in the dog.

9 Give the causes, symptoms and treatment of quarter crack.

10 Give the causes, symptoms and treatment of suppurative cellulitis of the pastern and fetlock.

11 What is meant by scratches? Give the causes, symptoms and treatment of scratches.

12 Give the causes, symptoms, prognosis and treatment of (*a*) rupture of the deep flexor tendon, (*b*) rupture of the suspensory ligament.

13 Describe the surgical treatment for the relief of tympany.

14 Give the symptoms and treatment of pulmonary emphysema.

15 Give the causes and symptoms of paralysis of the pharynx.

No.

Place

## College Department

### 39th Veterinary Examination

# SURGERY

**Wednesday,** January 25, 1905 — 1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Define ostitis, periostitis, necrosis, caries.

2 Mention *five* common diseases of the eye. Describe the causes, symptoms and termination of periodic ophthalmia.

3 Mention *five* common diseases of the hock. Give the causes, symptoms and treatment of curb.

4 Describe the symptoms and treatment of scrotal hernia.

5 Give the causes, symptoms and treatment of rachitis in the dog.

6 Describe the causes, symptoms, termination and treatment of paralysis of the radial nerve.

7 Give the cause, symptoms and treatment of verminous bronchitis in calves.

8 Give the causes, symptoms and treatment of inversion of the uterus in the cow.

9 What is meant by (*a*) aseptic surgery, (*b*) antiseptic surgery?

10 Give the causes, symptoms, prognosis and treatment of tetanus.

11 Describe the operation of castrating cryptorchids.

12 State the indications for the operation of phlebotomy of the jugular vein in horses and cattle. Describe the operation.

13 Give the causes, symptoms, prognosis and treatment of canker of the foot.

14 Mention the indications for the operation of paracentesis of the cornea. Describe the operation.

15 Describe the symptoms, treatment and usual termination of articular synovitis of the coffin joint.

*University of the State of New York*

No.

Place

## College Department

### 40th Veterinary Examination

## SURGERY

**Wednesday,** May 17, 1905 — 1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Give the causes, symptoms and treatment of facial paralysis.

2 Give the causes, symptoms, usual termination and treatment of injuries to the interdental spaces.

3 Give the chief causes and describe the symptoms of purulent collections in the frontal and the maxillary sinuses.

4 Differentiate the nasal discharges of acute nasal catarrh, chronic catarrh with purulent collections in the sinuses, and chronic glanders.

5 Give the causes, symptoms and treatment of abscess of the parotid gland.

6 Give the causes, symptoms and treatment of canker of the external ear in dogs.

7 Define goiter and state in what animals it is most common.

8 Describe tracheotomy and mention its uses and dangers. State how these dangers may be avoided.

9 Define congenital hernia and name its different forms.

10 Give the causes and the treatment of paralysis of the penis.

11 Give the symptoms and the treatment of paralysis of the radial nerve.

12 Give the pathology and the symptoms of ringbone.

13 Give the causes, symptoms, prognosis and treatment of capped hock.

14 Give the differential diagnosis of scrotal hernia, hydrocele and orchitis.

15 Define canker of the foot and give its prognosis and treatment.

No.

Place

## College Department

### 41st Veterinary Examination

## SURGERY

**Wednesday,** June 21, 1905—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Mention the causes of the bulging of the maxillary sinuses and state how the various causes may be distinguished from one another.

2 Mention the causes of purulent discharges from the nostrils and give the physical differentiation of these discharges.

3 Give the causes, symptoms and treatment of canker of the external ear in the dog.

4 Give the causes, pathology, symptoms and treatment of sitfast at the top of the neck.

5 Describe paracentesis abdominis and state its use.

6 Define scrotal hernia, name the other affections with which it may be confounded and show how it may be differentiated from these affections.

7 Describe rumenotomy and state its uses.

8 Describe amputation of the penis, mention its chief dangers and state how to avoid them.

9 Define scirrhus of the cord and give its causes, pathology and symptoms.

10 Give the causes, symptoms and diagnosis of thrombosis of the posterior aorta and its branches.

11 Give the prognosis and the treatment of stringhalt.

12 Describe the symptoms of infected nail wound of the navicular bursa. Give prognosis and treatment.

13 Give the pathology, symptoms and treatment of quitter.

14 Describe entropium and give its treatment.

15 Describe actinomycosis. Name the animals that are most liable to become affected by this disease and give the general manner of infection.

*University of the State of New York*

No.

## College Department

Place

### 38th Veterinary Examination

## OBSTETRICS

**Thursday,** September 29, 1904—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* no more. *Check the number* (✓) *of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Describe the uterus and give its functions.

2 Define menstruation.

3 Give the symptoms and treatment of leucorrhea.

4 Give the function of the liquor amnii in pregnancy and during labor.

5 Give the prognosis and treatment of torsion of the uterus.

6 Describe the mammary glands of the bitch.

7 Describe the proper method of delivering an adherent placenta.

8 What conditions are essential to impregnation?

9 Give the nature, causes and treatment of puerperal eclampsia.

10 Give the symptoms and treatment of colic in pregnant animals.

11 Give the chemical composition of cow's milk.

12 Give a diagrammatic description of the spermatozoa.

13 What is an embryo?

14 Give the sequelae of parturition.

15 Describe the lumbosacral position of the fetus and give method of delivery.

No.

Place

## College Department

### 39th Veterinary Examination

## OBSTETRICS

**Thursday,** January 26, 1905—9.15 a. m. to 12.15 p. m., only

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (√) *of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Give the principal causes of sterility in the mare and in the cow.

2 State the effects of in-and-in breeding on the constitution.

3 Give the pathology and treatment of parturient apoplexy.

4 Mention *five* abnormal presentations of the fetus.

5 State the causes of maternal dystocia.

6 Describe the ovaries of the mare.

7 Describe the fetal circulation, beginning at the left side of the heart. How does the fetal blood become purified?

8 Describe the method of delivering an anterior presentation (forelimbs back).

9 Give the causes, symptoms and treatment of umbilic hernia.

10 Write a prescription for agalactia in the mare.

11 Give the natural position of the fetus (*a*) before birth, (*b*) at birth.

12 State the differences between the uterus of the bitch and that of the mare.

13 What would determine the difference between nymphomania and tuberculosis?

14 Give the primary changes undergone by a fecundated ovum.

15 What diseased condition of the os uteri may take place between fecundation and parturition? Give symptoms and treatment.

*University of the State of New York*

No.

Place

## College Department

**40th Veterinary Examination**

# OBSTETRICS

**Thursday,** May 18, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Name the reproductive organs of the cow.

2 Mention the changes in the ovum following fertilization.

3 Describe the changes in the genital organs immediately following parturition.

4 Define multiple pregnancy and show how it may complicate labor.

5 Describe the mechanical treatment of displaced uterus.

6 Give the causes and the treatment of vaginitis.

7 Give the causes, symptoms and treatment of endometritis.

8 How may tumors of the uterus complicate labor?

9 Name the normal presentations of the fetus in domestic animals.

10 Give the average dimensions of the bony pelvis of the mare.

11 Give methods of resuscitation of an asphyxiated newborn foal.

12 Give the symptoms of rupture of the uterus during labor.

13 Give the treatment of rigidity of the os uteri during labor.

14 Under what circumstances should a posterior presentation be converted into an anterior presentation? Explain.

15 Give the treatment of laceration of the cervix.

No.

Place

## College Department

### 41st Veterinary Examination

# OBSTETRICS

**Thursday,** June 22, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (√) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 State the function of each of the internal female organs of generation.

2 Mention the changes that take place in the generative organs during pregnancy.

3 Mention the indications for the induction of premature labor.

4 Describe the umbilic cord and state its function.

5 Give the causes and the treatment of rupture of the uterus during labor.

6 Mention the physiologic changes following conception.

7 Give the causes and the treatment of vaginismus.

8 What antiseptic precautions should be employed in the conduct of labor?

9 Under what condition does delivery by abdominal section become justifiable?

10 Give the treatment of post-partum hemorrhage.

11 Name a disease of the eye that may occur in connection with gestation. Give the treatment of this disease.

12 Describe the corpus luteum of pregnancy.

13 Make a diagnosis of multiple pregnancy.

14 Give the preventive treatment of abortion.

15 Give the symptoms and the treatment of torsion of the uterus.

*University of the State of New York* 93

No.

## College Department

Place

### 38th Veterinary Examination

# PATHOLOGY, DIAGNOSIS AND PRACTICE

**Thursday,** September 29, 1904—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* no more. *Check the number* (✓) *of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Give the symptoms of canine distemper.

2 Describe the difference between an abscess, a cyst and a tumor.

3 What is the pulse? Give its different characters and explain the meaning of each.

4 State how fevers are divided for study. Give the symptoms of fever.

5 Define enzootic disease, epizootic disease, panzootic disease.

6 Mention the various colors of the visible mucous membrane and state the condition that each denotes.

7 Give the pathology, symptoms and treatment of pleurisy with effusion.

8 Define periodic ophthalmia and give its cause, treatment and termination.

9 Give the causes, pathology and treatment of acute laminitis.

10 Give the causes, symptoms and indications for the treatment of enteritis.

11 Give the lesion, symptoms and diagnosis of splint lameness.

12 Give the etiology, pathology and symptoms of foot-and-mouth disease.

13 Give the indications for the treatment of pharyngitis and state the complications that are to be feared.

14 State where Texas fever exists and give its cause. Describe a case of Texas fever.

15 Mention the different forms of colic and state their causes.

No.

Place

## College Department

### 39th Veterinary Examination

# PATHOLOGY, DIAGNOSIS AND PRACTICE

**Thursday,** January 26, 1905 — 1.15 to 4.15 p. m., only

*Answer any 10 of the questions or this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Mention the symptoms that indicate trichinosis in swine. Give prevention and treatment.

2 How should a case of fistulous withers of three months standing be treated?

3 What domestic animal is most subject to bronchial asthma? Give the causes, symptoms, prevention and treatment of bronchial asthma.

4 Give the causes, prevention and treatment of blue and viscid milk.

5 Mention the forms of tenia that infest sheep. Give briefly the life history of each.

6 Give causes, symptoms and treatment of chronic hepatitis.

7 What animals suffer from contagious ophthalmia? Give the diagnosis and treatment of contagious ophthalmia.

8 Give the diagnostic symptoms and the treatment of pure spasmodic colic.

9 Give the auscultatory sounds of pleurisy in each of its successive stages.

10 Describe rabies in the dog. How may a positive diagnosis of rabies be made?

11 Give the form and symptoms of variola affecting (*a*) the horse, (*b*) the cow, (*c*) the sheep, (*d*) the fowl.

12 Describe the treatment of scab in sheep.

13 Describe the method of testing suspected tuberculosis in a herd of cattle. State the precautions to be observed.

14 Give the cause, symptoms and preventive treatment of epizootic abortion in cattle.

15 Under what conditions are gallstones formed in domestic animals? Give the symptoms and treatment of gallstones

*University of the State of New York*

No. 95

Place

## College Department

### 40th Veterinary Examination

# PATHOLOGY, DIAGNOSIS AND PRACTICE

Thursday, May 18, 1905 — 1.15 to 4.15 p. m., only

*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Describe a tumor.

2 What is edema of the glottis? Under what circumstances does it most frequently occur? Give the indications for its treatment.

3 Define thrombosis, embolism. Where is thrombosis principally diagnosed in the horse? Describe the symptoms and give the prognosis.

4 What is hygroma of the hock? Explain the etiology and the pathology of hygroma of the hock.

5 Describe a case of stomatitis and give treatment. Name the various forms of stomatitis.

6 Define semiology, nosology.

7 What is inflammation? Give the clinical signs of inflammation and describe a method of treatment.

8 Describe a typical case of actinomycosis. Give etiology and treatment.

9 Make a differential diagnosis of spinal meningitis and azoturia.

10 Describe the mouth of the horse at the age of (*a*) 1 year, (*b*) 3 years, (*c*) 5 years, (*d*) 9 years.

11 What are the causes of ptyalism? In what *two* diseases is it frequently seen?

12 What is rabies? In what animal is rabies most frequent? How is it spread? Where is the germ found?

13 Where is lymphangitis most frequently found? Describe a case of lymphangitis and give the etiology, prognosis and treatment.

14 Give the clinical and the physical symptoms of a case of pneumonia in the second stage.

15 What is acute catarrh? Give the causes, symptoms and treatment.

No.

Place

## College Department

### 41st Veterinary Examination

# PATHOLOGY, DIAGNOSIS AND PRACTICE

### Thursday, June 22, 1905—1.15 to 4.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Give the pathology of hydrarthrosis. Where does hydrarthrosis usually make its appearance?

2 Describe a spavin. Give the usual history of a case of spavin and show how to diagnose spavin lameness.

3 What is meant by the term osteómyelitis?

4 Name the diseases from which a case of tuberculosis might be differentiated with certainty only on a postmortem examination.

5 What is a cyst? Describe the difference between a cyst and an abscess.

6 Give the pathology, symptoms and treatment of navicular arthritis.

7 What is epistaxis? How may the source of the blood be determined in a case of epistaxis?

8 Mention in regard to horses and cows the parts of the body usually attacked by erythema. Give the causes and the treatment of erythema.

9 Give in regard to epizootic aphthae (*a*) the germ that probably causes it, (*b*) the manner in which the germ is transmitted, (*c*) the method of eradicating it.

10 Make a differential diagnosis of laryngitis and pharyngitis.

11 Describe a case of periodic ophthalmia. Give the prognosis, symptoms and modern treatment of periodic ophthalmia, and state for what it may be mistaken.

12 Define volvulus and give its symptoms.

13 Describe a case of intussusception. Give the causes of intussusception.

14 What is emphysema? Give two specific symptoms and the treatment of emphysema.

15 Describe a case of bronchitis in a dog. Give the prognosis, symptoms and treatment of bronchitis in the dog.

*University of the State of New York*

No.

## College Department

Place

**38th Veterinary Examination**

# THERAPEUTICS AND MATERIA MEDICA

**Friday,** September 30, 1904—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* no more. *Check the number* (✓) *of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 What is meant by (*a*) local remedies, (*b*) general remedies?

2 Write a prescription for one ounce of a 4 per cent solution of cocain.

3 State the properties and uses of aconite.

4 State the properties and uses of phenol.

5 What medicines are indicated in azoturia?

6 State the properties and uses of hyposulfite of soda.

7 Prescribe for a dog suffering from eczema rubrum.

8 State the uses of Dover's powder in veterinary practice.

9 What medicinal agents are indicated in a case of chronic lead-poisoning?

10 With what class of medicines is opium incompatible?

11 State the properties and uses of glycerin.

12 Give the composition of Fowler's solution of arsenic. State the dose for (*a*) the horse, (*b*) cattle, (*c*) the dog.

13 Prescribe for flatulent colic in the horse, avoiding opiates.

14 Mention the different varieties of aloes and state where they are obtained. Give the properties and uses of aloes.

15 What is (*a*) a saline cathartic, (*b*) a cholagogue cathartic? State the dose of each.

No.

Place

## College Department

### 39th Veterinary Examination

# THERAPEUTICS AND MATERIA MEDICA

**Friday,** January 27, 1905 — 9.15 a. m to 12 15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number* (✓) *of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

**1 What are the indications for the use of counter irritants? Mention 10 counter irritants and state which are most frequently used in veterinary practice.**

**2 What are the indications for the use of narcotics? Mention the narcotics most frequently used in veterinary practice.**

**3 Write a prescription for a physic ball suitable for a horse weighing 1000 lbs. How soon should the ball operate?**

**4 Write a prescription for the treatment of diabetes insipidus.**

**5 What are the indications for the use of intestinal astringents? Mention *five* remedies of this class and state the dose of each for *one* of the following: horse, cow, dog.**

6 Describe glycerin and give its derivation and uses.

7 Mention *five* antipyretics and state the dose of each for the horse, the cow and the dog

8 Write a prescription for a solution of strychnin sulfate suitable for hypodermic use. State the dose of the solution.

9 State with regard to nux vomica (*a*) its medicinal uses, (*b*) *two* alkaloids obtained from it, (*c*) dose for the horse.

10 From what is cantharides obtained? How may powdered cantharides be distinguished from powdered licorice? What proportions of cantharides enter into blistering ointment?

11 Describe the preparation of tuberculin.

12 Write a prescription for anemia.

13 Mention the. medicinal uses of cinchona bark and state the dose for the horse and for the dog.

14 Mention *five* official preparations of potassium and state the dose of each for the horse, the cow and the dog.

15 Mention the articles necessary for use in the dispensary.

*University of the State of New York*

No.

Place

## College Department

**40th Veterinary Examination**

# THERAPEUTICS AND MATERIA MEDICA

**Friday,** May 19, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* no more. *Check the number* (✓) *of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 In what form or forms may arsenic be given as a tonic and for what diseases?

2 Describe the symptoms of chronic arsenical poisoning.

3 Describe the symptoms produced by an overdose of aconite. State the maximum dose of the fluid extract of aconite.

4 Is morphin of any service in acute indigestion? Give reasons to justify your answer.

5 Which is the better local treatment for acute laminitis, hot applications or cold applications? Justify your answer.

6 Prescribe for a horse suffering from diabetes insipidus and give directions as to diet and work.

7 What is adrenalin chlorid? Mention the uses of adrenalin chlorid.

8 State whether or not bloodletting (phlebotomy) is advisable in acute inflammation, and name medicines that would have an effect on the pulse similar to that of bloodletting.

9 What remedies are useful for scab in sheep? Give directions for their use.

10 Give the properties and the uses of sulfur. Name the principal preparations of sulfur.

11 Mention the natural habitat of the castor oil bean. In what way does castor oil act as a cathartic?

12 State the maximum dose of *each* of the following: aloes fluid extract of digitalis, fluid extract of belladonna, strychnin, morphin sulfate for hypodermic use.

13 Give the properties and the uses of creolin.

14 Give the properties and the uses of prussic acid.

15 Give the properties and the uses of salicin.

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No.

Place

## College Department

### 41st Veterinary Examination

# THERAPEUTICS AND MATERIA MEDICA

### Friday, June 23, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer any 10 of the questions on this paper but* **no more.** *Check the number (✓) of each one of the questions you have answered. Unless otherwise stated all questions relate to the horse.*

1 Mention the different methods of administering medicines to animals.

2 What is an anthelmintic? Name *three* anthelmintics and state the dose of each for the dog.

3 What is an epispastic? Name *five* epispastics, mentioning the strength in which each is generally applied.

4 Name *five* tonics and state the dose of each for the horse, the cow and the dog.

5 State the uses of hydrochloric acid.

6 What is cantharides and where is it obtained? Mention the uses and the abuses of cantharides.

7 What is cinchona? State the uses of cinchona and name an alkaloid obtained from it.

8 What is aconite? Mention its preparations and its uses. State the dose of the fluid extract of aconite.

9 Give the properties and the uses of digitalis.

10 Give the properties and the uses of aloes.

11 Prescribe for a horse suffering from conjunctivitis.

12 Prescribe for a dog suffering from mange.

13 Give the properties and the uses of iodin. Mention the preparations of iodin.

14 Give the properties and the uses of belladonna. State the dose of the fluid extract of belladonna.

15 Give the properties and the uses of acetanilid.

## College Department

2D EXAMINATION

FOR

# REGISTRATION OF NURSES

**Tuesday,** January 24, 1905 — 1.15 to 4.15 p. m., only

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*Answer 10 questions but* **no more.** *Male nurses must choose at least two questions each from divisions 1, 2, 4, 5; female nurses at least two questions each from divisions 1, 3, 4, 5. Answers in excess of the number required will not be considered. Check the number (√) of each one of the questions you have answered.*

### DIVISION 1 — SURGERY

1 Describe in detail the preparation of the patient for an abdominal operation.

2 What is meant by (*a*) the aseptic method, (*b*) the antiseptic method?

3 What precautions should be taken in using a catheter after a vaginal operation?

4 Describe the preparation of normal salt solution.

### DIVISION 2 — GENITO-URINARY CASES

FOR MALE NURSES

5 What is retention of urine? Mention some of its causes.

6 In caring for a syphilitic patient, what precautions should be used to prevent the spread of the infection?

7 Describe the irrigation of the bladder.

8 Mention the symptoms to be looked for when a patient is being treated with mercurials.

### DIVISION 3 — OBSTETRICS

FOR FEMALE NURSES

9 Name the female organs of generation.

10 Give the list of articles for the doctor's use during labor.

11 If requested by the doctor to watch the course of labor, how would you make an examination and at what stage would you send for him?

12 Describe procedure in case of instrumental delivery.

### DIVISION 4—FEBRILE DISEASES

13 Give the period of incubation and of duration of a case of scarlet fever. Mention the possible complications of scarlet fever.

14 Give precautionary methods necessary to prevent the transmission of (*a*) typhoid fever, (*b*) measles.

15 Describe the course of fever in a typical case of pneumonia.

16 What diet is indicated in a case of pulmonary tuberculosis?

### DIVISION 5—DRUGS

17 State the objections to the use of bichlorid for disinfecting linen, instruments, typhoid stools and for internal application.

18 State the different methods of administering castor oil.

19 What is opium? Name some antidotes to opium that are easily obtainable.

20 Name some preparations of iron. Mention the precautions that should be used in administering iron.

## College Department

3D EXAMINATION

FOR

# REGISTRATION OF NURSES

**Tuesday,** June 20, 1905 — 1.15 to 4.15 p. m., only

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*Answer 10 questions but* **no more.** *Male nurses must choose at least two questions each from divisions 1, 2, 4, 5; female nurses at least two questions each from divisions 1, 3, 4, 5. Answers in excess of the number required will not be considered. Check the number (√) of each one of the questions you have answered.*

### DIVISION 1 — SURGERY

1 State how the nurse should prepare her hands before assisting the surgeon at an operation or a dressing.

2 In the absence of the physician, what simple remedies would the nurse be justified in using in a case of superficial burns?

3 When the patient is obliged to remain indefinitely in the dorsal position what parts of the body require special care?

4 For what purposes are poultices used? Mention the poultice that is considered the best and describe the method of making it.

### DIVISION 2 — GENITO-URINARY CASES

FOR MALE NURSES

5 Mention the more common complications of gonorrhea.

6 Describe a mercurial inunction.

7 State how a catheter should be sterilized and cared for.

8 Give (*a*) the normal amount of urine that should be excreted by an adult in 24 hours, (*b*) the normal specific gravity of urine.

### DIVISION 3 — OBSTETRICS

FOR FEMALE NURSES

9 Mention the signs of labor.

10 Describe the preparation of the patient and of the bed for labor.

11 What is placenta praevia? Give the symptoms and describe the care that should be exercised by the nurse in a case of placenta praevia.

12 Describe the care of the breasts and nipples before and after confinement. How often should the child nurse (*a*) during the first three days, (*b*) after milk has been established?

### DIVISION 4 — FEBRILE DISEASES

13 Describe the administration of medicine by the use of the hypodermic needle.

14 Give the symptoms of perforation in typhoid fever. Describe the treatment that should be given by the nurse while awaiting the arrival of the physician.

15 Describe lockjaw. What methods may be used to administer nourishment in a case of lockjaw?

16 Mention the precautions to be observed in nursing a case of tuberculosis.

### DIVISION 5 — DRUGS

17 Name the principal disinfectant solutions.

18 Write the medical abbreviation for (*a*) two grains, (*b*) one dram, (*c*) half an ounce.

19 What is strychnin? Give the symptoms of strychnin poisoning and name an antidote for it.

20 Give some general rules regarding the mixing of two or more drugs in one dose.

*University of the State of New York*

## College Department

17TH ACCOUNTANT EXAMINATION

# THEORY OF ACCOUNTS

**Tuesday,** January 24, 1905—9.15 a. m. to 12.15 p. m., only

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"The Regents of the University shall make rules for the examination of persons applying for certificates under this act, and may appoint a board of three examiners for the purpose . . . "

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1 Draw (*a*) a promissory note of a corporation, (*b*) a check of a corporation. For what reason or reasons should these papers be drawn in this way?

2 State the value and significance of countersignature on corporation checks. How is such countersignature usually made?

3 Where and in what manner of entry should record be made of sales of plant and items of machinery disposed of because worn out or otherwise useless?

4 On paper ruled as for a stock ledger make entry of the following stock transactions of William Henderson, closing the account as of October 31, 1904 and carrying down the balance:

*a* 100 shares (par value $100) originally issued, full paid at par to William Henderson by certificate #5, August 16, 1904.

*b* William Henderson sells 50 shares of the original 100 to Charles Gibbons at $120, September 14, 1904, receiving certificate #37 for shares retained.

*c* October 28, 1904 William Henderson purchases from John Hogan 25 shares at $115 and receives certificate #78.

5 State the points of difference between a statement of receipts and disbursements and a statement of revenues and expenses.

6 Distinguish between the accounts usually designated "Surplus" and "Undivided profits," as to (*a*) definition, (*b*) treatment.

7 How would you record in your books of account the various elements entering into the cost of a manufactured article?

8 State circumstances under which it is proper to debit or credit "Surplus" account.

9 Mention *five* items of expenditure which should be classified under "Maintenance of way."

10 What are *fiduciary accounts?* Give *three* examples.

11 Of $300,000 authorized capital (common stock) $260,000 has been subscribed. $80,000 was paid in cash and $100,000 in property. The remainder is to be paid in cash in five equal instalments. The first instalment has been called and collected. The second instalment has been called but has not yet been collected. Make original entries covering above transactions and prepare ledger accounts.

12 What is a dividend? State when and how dividends become effective. State how the declaration and payment of dividends are usually recorded in books of account.

13 Define current assets and current liabilities and mention *five* items under each class.

14 How would you treat goods shipped "on approval" (*a*) at the time of the original transaction, (*b*) when closing the books?

15 Describe the transfer book kept by some corporations. State its use and give an estimate of its value.

## College Department

### 18TH ACCOUNTANT EXAMINATION

# THEORY OF ACCOUNTS

**Tuesday,** June 20, 1905—9.15 a. m. to 12.15 p. m., only

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1 A merchant draws a draft of $1,000 at four months on a customer who owes him on open account and the draft is accepted on February 2, 1905. On March 13, 1905 he discounts the draft at a bank at 6% per annum. What entries should be made on the merchant's books to record properly the transactions?

2 Define the term depreciation and give generally your method of determining the amount to be charged against income.

3 Show the form of a purchase ledger for a mercantile concern, and state whether you would recommend the use of a bound or loose leaf book. Give reason for your answer.

4 Define fixed assets, current assets. Give *two* examples of each class.

5 A grocery house employs a number of salesmen who act as collectors. Suggest a system that would tend to prevent defalcations on their part.

6 Give the advantages and the disadvantages of a voucher system of accounts.

7 What is the difference between a trial balance and a balance sheet?

8 In what order should the assets in a balance sheet be set out? Give reasons.

9 What governs the distribution of profits in (*a*) a partnership, (*b*) a corporation?

10 Give fully your understanding of (*a*) revenue, (*b*) receipts. Show wherein they differ.

11 Suggest books for a sanitarium that is supported by public charity.

12 Are there any unalterable rules governing the trading and the profit and loss accounts? Give the general acceptation of the terms.

13 In what books should an administrator keep his accounts? What, if any, special rulings would you suggest? Illustrate and give reasons.

14 What are the advantages of purchase journals and sales journals? How are the transactions that are recorded in such journals brought into the general ledger?

15 What is a controlling account? Give an example of such an account. Answer fully.

*University of the State of New York*

## College Department

17TH ACCOUNTANT EXAMINATION

# PRACTICAL ACCOUNTING

Tuesday, January 24, 1905—1.15 to 5.15 p. m., only

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1 A company is formed, under the laws of Mexico, to take over and work certain mining properties. At the end of one year the company is found to possess

| | |
|---|---|
| Mining lands | $484,675.48 |
| Buildings and improvements | 20,499.76 |
| Machinery | 25,612.88 |
| Cash on hand and in bank | 24,612.50 |
| Silver bullion | 85,209.50 |
| Ore in dump | 13,680.00 |
| Merchandise | 5,420.80 |
| Fuel, oil etc. | 679.20 |
| The company owes | |
| On open accounts | 3,890.12 |
| On account of pay rolls | 400.00 |
| Note due in six months, with interest at 6% | 25,000.00 |
| The capital stock (full paid) is | 500,000.00 |

Set up balance sheet.

2 As the greater part of the capital invested in the undertaking set forth in question 1 is furnished by citizens of the State of New York, a corporation is organized under the laws of that state to acquire a majority of the capital stock of the Mexican company and thus to control its affairs. The capital is fixed at $200,000, all of which is subscribed for and paid in at 120. An issue of $200,000 in 20 year 6 per cent gold bonds is authorized and sold at 110. The new company purchases 4,000 shares of the capital stock of the Mexican company, par value $100 per share, Mexican silver at 150. At the end of

one year a dividend of 15% is received on these shares. The taxes and expenses of the company are $8,640.

Set up a profit and loss statement and balance sheet, assuming the value of the Mexican dollar to be 50 cents, gold.

3 A. B. died January 17, 1902, leaving a will appointing three executors. The testator's personal estate consisted of stocks, bonds etc., appraised at $500,000, rents accrued but unpaid $750 and dividends declared but unpaid $3,000. During the administration sundry stocks, bonds etc. were sold showing an increase over appraised value of $10,000. Real estate was sold for $60,000 and the rents, dividends and interest accruing subsequent to date of death amounted to $76,000. The executors during the administration paid for probate of will and issue of letters $150, funeral expenses $750, mourning $500, monument $1,500, sundry debts and claims $25,000, clerk hire $1,200, counsel fees $2,500, personal tax on estate $500, advertising and expenses of selling real estate $900, fire insurance $250, taxes accrued at death $300, subsequent taxes $600, assessments $400, repairs etc. $1,200, special legacy $5,000; also advances to legatees from capital $80,000, from income $65,000 and trusts set up $300,000.

It is the purpose of the executors to render an account of their proceedings at this present date. They have invested in bonds and mortgages $50,000; sundry stocks, bonds etc. on hand at testator's death and still unsold are appraised $100,000 and there is cash on hand $14,000.

From the above statement prepare a summary of account, distinguishing as to principal and income and showing balance on hand for distribution and the amount of commission due the executors.

4 A, B and C were partners in business for several years. A died December 31, 1903. The articles of copartnership provided that on any change in the firm the goodwill should be taken into account and its value divided—one half to A and one quarter each to B and C. The balance sheet at the date of A's death was as follows:

| ASSETS | | |
|---|---|---|
| Cash | $1,500 | |
| Merchandise on hand | 12,000 | |
| Sundry notes and accounts receivable | 15,000 | $28,500 |

LIABILITIES

| | | |
|---|---|---|
| Sundry accounts payable | $8,500 | |
| A's net investment | 10,000 | |
| B's " | 5,000 | |
| C's " | 5,000 | $28,500 |

In January, 1904, B and C arranged with D to come into the firm with $5,000. The goodwill is, by agreement, to be valued at $3,000. The new firm, consisting of B, C and D, takes over the business and goodwill in equal shares, subject to an allowance of 2½% on the notes and accounts receivable. It pays the estate of A $5,000, with the understanding that the balance due A's estate shall remain as a loan at the rate of 5% interest.

Prepare the balance sheet and the capital accounts of B, C and D as they should appear at the beginning of the new business, writing off the purchase of goodwill in equal proportions to amount of capital invested.

5 The Metropolitan Book Company, a corporation, goes into voluntary liquidation and the directors of the company, three in number, are designated trustees in liquidation.

Below is a trial balance of the Book Company as of July 1, 1903, the date when its affairs are turned over to the trustees:

| | | | |
|---|---|---|---|
| 1 | Capital stock | | $20,000.00 |
| 2 | Cash | $553.69 | |
| 3 | Office furniture | 1,666.92 | |
| 4 | Meter deposit | 60.00 | |
| 5 | Accounts receivable | 26,153.95 | |
| 6 | Rogers & Co. moneys collected for their account | | 14,738.00 |
| 7 | Notes payable | | 27,573.50 |
| 8 | Accounts payable | | 4,197.22 |
| 9 | Merchandise purchases | 27,404.74 | |
| 10 | Merchandise sales | | 8,045.35 |
| 11 | Expense | 10,751.97 | |
| 12 | Surplus (deficit) | 7,962.80 | |
| | | $74,554.07 | $74,554.07 |

Value of merchandise on hand $20,183.86; other assets (items 3, 4 and 5) valued as in ledger.

Trustees' cash receipts and payments are as follows:

RECEIPTS

| | |
|---|---|
| Balance on hand | $553.69 |
| Meter deposit | 60.00 |
| Office furniture sold | 487.90 |
| Accounts receivable collected | 22,872.75 |
| Additional collections for Rogers & Co. (in full) | 1,965.24 |
| Sales of merchandise | 22,090.70 |
| Commissions received from Rogers & Co. | 6,703.24 |
| | $54,733.52 |

PAYMENTS

| | |
|---|---|
| Notes paid | $27,573.50 |
| Accounts paid | 4,197.22 |
| Merchandise bought | 562.55 |
| Expenses | 5,697.01 |
| Remitted to Rogers & Co. in full | 16,703.24 |
| | $54,733.52 |

Accounts receivable not collected are worthless. Prepa the account of the trustees in liquidation.

6 From the facts set forth in question 5 arrange, in skeleto form, ledger accounts and outlines of subordinate book entri for

*a* The Metropolitan Book Co.
  1 as turned over to trustees, July 1, 1903;
  2 as closed after receipt of trustees' account;

*b* The trustees in liquidation
  1 when business was turned over to them, July 1, 190
  2 when business was closed and account rendered.

## College Department

### 18TH ACCOUNTANT EXAMINATION

# PRACTICAL ACCOUNTING

### Tuesday, June 20, 1905—1.15 to 5.15 p. m., only

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1 Three men, located respectively at New York, Chicago and Minneapolis, conducted a business as partners. The partnership agreement recited that the New York partner was to receive a salary of $5,000 a year, the Chicago partner a salary of $3,000 a year and one third of the profits of that branch, and the Minneapolis partner a salary of $2,000 a year and one quarter of the profits of that branch. Six per cent interest was to be allowed on the capital used in the business, $500,000, which was employed one half at New York, one third at Chicago and one sixth at Minneapolis. Repairs and renewals were to be charged to Plant, and a depreciation of 6% per annum was to be allowed. Interest on borrowed money was to be distributed according to the invested capital at each branch. Plant Account at the beginning of the period showed as follows: New York $250,000; Chicago $200,000; Minneapolis $150,000. Repairs and renewals paid during the year amounted to $25,000 at New York, $30,000 at Chicago and $15,000 at Minneapolis; interest on borrowed money $15,000. Subject to these items, the profits of the year amounted to $50,000 at New York, $35,000 at Chicago and $25,000 at Minneapolis.

Complete the profit and loss account for the year.

2 A corporation took over the business of an individual whose books showed him to be worth $125,000, for the sum of $200,000, payable $50,000 in bonds, $50,000 in preferred stock, $50,000 in common stock and the remainder in cash. The capital of the company was $100,000 preferred stock and $100,000 common stock, and bonds were issued for $100,000.

**According to the subscriptions the stock was to be paid in as follows: 10% on application, 40% in 30 days after allotment and 50% in three months thereafter. On the bonds 10% was to be paid on application and the balance in 30 days after allotment.**

**Make the necessary journal entries on the books of the company to cover these transactions in accordance with the statement following:**

| | | |
|---|---|---|
| **Property and plant** | **$75,000** | |
| **Raw material** | **25,000** | |
| **Unfinished orders** | **15,000** | |
| **Accounts receivable** | **25,000** | |
| **Cash** | **10,000** | |
| **Accounts payable** | | **$25,000** |

**Make journal entries closing the books of the individual vendor.**

**3 A firm which began business with $50,000 capital goes into bankruptcy at the expiration of three years. For the first year its transactions showed a profit of $4,000 after $2,500 interest on capital had been charged. The other years showed a loss of $3,000 and $2,000 respectively. The partners had drawn at the rate of $5,000 a year. The condition of the firm at the time of failure was as follows:**

| | |
|---|---|
| Unsecured creditors | $37,000 |
| Secured " | 30,000 |
| (The security stood in the books at $35,000 but was estimated to produce only $20,000) | |
| Wages | 1,600 |
| Merchandise (estimated to realize $16,000) | 20,000 |
| Accounts receivable ($2,000 uncollectible) | 15,000 |
| Real estate (estimated value $19,000) | 15,000 |
| Machinery and plant (estimated to produce $17,000) | 25,000 |
| Cash | 100 |

Prepare statement of affairs and deficiency account.

4 The trial balance of Jones & Smith, Chicago branch, shows Dec. 31, 1904, the following:

| | | |
|---|---|---|
| Home office | | $2,000 |
| Due from customers | $2,500 | |
| Cash on hand | 1,000 | |
| Expenses | 1,900 | |
| Merchandise | | 3,400 |
| | $5,400 | $5,400 |

Inventory $1,000.

Draft the necessary journal entries to close the accounts on the branch books, and the entries to be made in the home office to make the books agree.

5 You are asked to prepare an account showing the profit earned by a concern for a certain period. The books have been kept by single entry and you gather from them the following:

| | |
|---|---|
| Capital | $19,360 |
| Cash | 2,600 |
| Accounts receivable | 15,600 |
| Merchandise | 10,400 |
| Fixtures | 1,650 |
| Accounts payable | 3,850 |
| Bills payable | 5,000 |
| Merchandise used by proprietor | 800 |

The Capital above set out is the balance of the account after $1,500 withdrawn during the period and $1,200 for salary have been charged up against it.

Set up the profit and loss account.

6 Jones & Co. consign to Smith & Co. to be sold for their account 5,000 bushels of potatoes. The consignees pay freight and cartage $200, and make sales as follows:

1,000 bu. @ 75¢ a bu.
1,000 " @ 76¢ "
1,000 " @ 74¢ "
1,000 " @ 77¢ "
1,000 " @ 80¢ "

A charge of 5% commission is made on the sales and the check for balance is sent with account sales.

Show ledger accounts in books of consignor and consignee.

## College Department

### 17TH ACCOUNTANT EXAMINATION

# AUDITING

**Wednesday, January 25, 1905—9.15 a. m. to 12.15 p. m., only**

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1 Is it the duty of an auditor to examine the transfer books of a corporation? Explain.

2 If in auditing the accounts covering the first year's business of a corporation the examination reveals an item for preliminary expenses, $4,000, how should it be treated?

3 What should be the first thing done by the auditor on beginning the audit of a manufacturing business carried on by an individual?

4 How may the auditor protect himself in a case where there are many branches that he is not permitted to visit through which some of the business is carried on?

5 A firm carries on its books a number of parcels of real estate. By what means could the auditor satisfy himself as to the ownership and value of the several parcels?

6 In making an examination of the assets of a company, the officer charged with the custody of securities owned is unable to produce a certain certificate of stock which should be on hand when called for. It is produced later. Would it be the duty of the auditor in charge to inquire into the reason for its absence in the first instance? Give reasons for your answer.

7 It is customary with some institutions to carry secret reserves. State your views respecting that custom.

8 What system would you advise for checking the accounts of collectors for a charitable organization?

9 You are asked to certify to the profits of a corporation for a period of five years. State in detail what ground you would cover and how you would prove the correctness of your conclusions.

10 Referring to question 9, let us assume that you find that the profits were, for the 1st year $10,000, 2d year $12,000, 3d year $40,000, 4th year $20,000, and 5th year $8,000. The client wants a certificate stating that you find the average annual net profit for the period to be $18,000. State your views. How would you word your certificate?

11 An insurance company invests in the stocks and bonds of other corporations, and the books show a great many purchases and sales of securities. How should these transactions be verified?

12 State how, in auditing the accounts of a bank, you would prove (*a*) the collateral to loans, (*b*) the items in transit, (*c*) the accounts of depositors.

13 Give a short statement of the actual work done by you in connection with some audit in which you have been engaged.

14 A bank enters against overdrafts the interest accrued thereon. If an account is of questionable value, what should be its treatment in the revenue account of the interest so charged to it?

15 A company authorizes its officers to borrow for its account $100,000 and give as security $200,000 of the first mortgage bonds of the company. How should this transaction be treated in the balance sheet?

## College Department

18TH ACCOUNTANT EXAMINATION

# AUDITING

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1 What is an audit? Mention the kinds of audit commonly required and explain the object of each.

2 At what stage in an audit should cash and negotiable securities be verified? Why?

3 How should the balance due from banks and from sundry debtors on open account be verified?

4 Mention a good method of ascertaining whether debts are good, bad or doubtful. How should items under each of these classes be treated in the profit and loss account and in the balance sheet?

5 How may pay rolls be manipulated to conceal fraud? What steps should be taken in a first audit to detect such manipulation and to prevent its recurrence?

6 Give the form of an unqualified certificate of audit.

7 Is it ever advisable to give a qualified certificate of audit? If so, under what circumstances? Write such a certificate.

8 In auditing the accounts of a manufacturing corporation, what steps should be taken to verify the correctness of the inventory of raw material and finished, or partly finished, products on hand?

9 In making a complete audit, how should the accountant satisfy himself that all disbursements have been actually made as charged in the accounts?

10 Outline your method of procedure in auditing the accounts of a wholesale dry goods store.

11 The secretary of a manufacturing corporation has undertaken to close its books. The balance to the credit of the profit and loss account is just sufficient to enable the directors to declare a small dividend, which they propose to do. At this juncture the services of an accountant are engaged. He finds that no provision for depreciation has been made and that all expenditures for repairs and renewals, amounting to more than the proposed dividend, have been charged direct to plant account. Show the nature of any corrective entries that should be made. What would be the effect of such entries, there being no surplus?

12 Mention the methods of manipulating accounts that are most commonly resorted to for the purpose of concealing fraud and embezzlement.

13 Mention *five* of the technical errors that frequently occur in the keeping of accounts, and give the method of detecting them.

14 In auditing the accounts of a corporation engaged in the business of erecting gas retorts in various sections of the country, you have reason to suspect that losses are steadily sustained on account of the theft of valuable tools by workmen. What recommendation would you make for the purpose of preventing such losses?

15 How should consignments outward be treated in the balance sheet of the consignor, no account sales having been received?

## College Department

### 17TH ACCOUNTANT EXAMINATION

# COMMERCIAL LAW

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1 Is a partnership dissolved if one partner becomes bankrupt or makes an assignment for the benefit of his creditors? Is it the same in case of mere insolvency? Where there is no agreement is a partner entitled to interest on the excess of capital that he is allowed to accumulate in the business?

2 State the rule in respect to making and filing the inventory of an executor. Should real estate be included? How about property located in other states? How should the interest of the decedent in the business and property of a firm be stated?

3 Does a person who transfers a note or other negotiable instrument by indorsing it "without recourse" relieve himself of all liability? If not, what obligations remain? Explain.

4 Within what time after the reception of an account must objection be made in order to prevent its becoming an account stated? When does the statute of limitations begin to run on an account stated? When does the balance of an account stated begin to draw interest?

5 A had a mortgage on B's property and had properly begun action to foreclose. Before completion of the action B went into bankruptcy. B's trustee in bankruptcy now contends that A may not foreclose the mortgage; also that A may not enforce the mortgage bond against the bankrupt's estate, as A has taken the mortgage as security. Is any part of the trustee's contention correct? Give reasons.

6 Define abstract of title. What should such abstract show? What is meant by the filing of lis pendens and what is the purpose of such filing?

7 What is a judgment and as to what is it conclusive? On what property of the judgment debtor is it a lien?

8 If a decedent contracts to sell real estate during his lifetime and the purchase money remains unpaid at his death, to what class of property does this unpaid purchase money belong? If a mortgage is foreclosed after the death of the owner of the mortgaged property, the surplus, after the mortgage is satisfied, belongs to what class? Classify rents of real estate of a decedent, which became due before his death and which become due after his death.

9 Mention *three* ways by which a debt may be renewed so that the statute of limitations will recommence to run from the date of renewal.

10 State the rule respecting the demand for acceptance of a bill of exchange drawn payable "after sight." Is the rule the same if it is drawn payable at a fixed date or at a certain number of days after date? If the holder of a bill fails to make demand when he should by law have made it, does he sacrifice any right of action on the consideration that the bill represents?

11 What law of place governs in the matter of disposition of real estate by will? Is it the same in respect to personal property? Does the law of the place where the will was made affect it?

12 What is understood by the term "collateral securities"? In what respect does a pledge differ from a mortgage? May securities pledged for the payment of a certain loan be held for other debts?

13 How must a deed or conveyance to a firm be drawn? What is meant by the term profits when used in connection with partnership matters? In estimating the profits of a firm how should permanent improvements be treated?

14 What effect has the alteration of a material part of a written instrument without the consent of all parties thereto? Is the effect the same if the alteration works no actual injury? Explain.

15 Has the executor of a solvent estate an insurable interest in the real estate of the decedent? Would your answer be the same in the case of an insolvent estate? Has a retiring partner an insurable interest in the firm property? Explain.

## College Department

### 18TH ACCOUNTANT EXAMINATION

## COMMERCIAL LAW

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**1 Write, without unnecessary words, *each* of the following instruments: promissory note, time draft, bank check.**

**2 State whether or not the following instrument is negotiable:**

> **This certifies that the Northeastern Grain Elevator Company has received 10,000 bushels no. 1 wheat from John Jones, which will be returned to him, or his order, on return of this certificate, properly indorsed.**
>
> THE NORTHEASTERN GRAIN ELEVATOR CO.
> by John Smith, President

Give reasons for your answer. What are the requirements necessary to a negotiable instrument?

3 If default is made in the payment of commercial paper when due, what must be done to charge the maker and what to charge the indorser, in *each* of the following cases: (*a*) promissory note, (*b*) domestic bill of exchange, (*c*) foreign bill of exchange?

4 What in the State of New York is a domestic corporation? What is a foreign corporation? Mention *three* disadvantages that would affect a foreign corporation whose entire business and capital are invested in the State of New York.

5 What liability for the debts of a domestic (N. Y.) corporation devolves on (*a*) the stockholders, (*b*) the directors? How is such liability limited? Mention any special modifications of such liability in the following particular classes of corporations: a bank, a club, a church.

6 How may the charter of a domestic corporation organized under the stock corporation law be modified? How may such a corporation be dissolved?

7 What is a contract? Mention *five* essentials of a contract. What is a quasi contract? Give an example of a quasi contract.

8 What limitations govern the making of contracts by (*a*) corporations, (*b*) infants, (*c*) married women, (*d*) lunatics and habitual drunkards?

9 What is a partnership and how is it formed?

10 Show in what respects the following differ: (*a*) partnership and corporation, (*b*) partnership and joint stock company, (*c*) joint stock company and corporation.

11 In what ways may a partnership be dissolved?

12 A firm is dissolved by the retirement of one of three partners, the two who remain agreeing in writing to assume all responsibility for outstanding firm debts. Before these debts are paid the burning of the store and the failure of an insurance company render the firm hopelessly insolvent. Can the retired partner be held for any part of the debts? State the principle.

13 A banker takes for safe-keeping a package of money and securities marked with the depositor's name. The package is soon after stolen by the banker's cashier, who has hitherto borne a good reputation and has in no way excited suspicion. Is the banker liable? What is the principle?

14 Under what circumstances and on whose application may the following be declared bankrupt: (*a*) an individual, (*b*) a partnership, (*c*) a corporation? What payments or transfers are made void by the granting of a petition in bankruptcy?

15 Under what circumstances will a discharge in bankruptcy be granted and what is its effect? A discharged bankrupt writes a letter to a creditor promising to pay a debt incurred before the proceedings in bankruptcy. Is this promise binding? What is the principle?

## College Department

### 15TH BUSINESS EXAMINATION

# ADVANCED BOOKKEEPING

**Tuesday,** January 24, 1905—9.15 a. m. to 12.15 p. m., **only**

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*Answer all questions. Double entry bookkeeping is implied.* **Ruled journal or ledger paper** *may be used, but the candidate will be* **held responsible** *for the ruling called for by the questions. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–10 Wilson Harper is a jobbing and wholesale grocer in Rochester. His business is growing, and he wants a safe man who is a competent accountant to look after the store and take charge of the books and finances. Abner Wells, formerly a fellow-townsman of Harper and highly esteemed by him, has been head bookkeeper for a provision house in Chicago. Harper writes to Wells and invites him to become a partner in the Rochester business, which proposal after further correspondence is mutually agreed to. The partnership goes into effect Jan. 2, 1905, under the firm name of Harper & Wells.

Harper invests cash $2500, merchandise $6050, furniture and fixtures $450, and Wells invests cash $2000 and his interest-bearing note at six months, for $1000, dated Jan. 2, 1905, and indorsed by his uncle, Charles Barton. Losses or gains are to be shared in proportion to capital and the duration of the partnership is not limited. Harper is to settle the old books, independent of the new firm, which opens a new set.

The books of account are, general ledger, sales ledger, journal, cashbook, sales book and invoice book. The cashbook is to have four money columns (each ruled for dollars and cents) on both the debit and the credit page, for the convenient handling of merchandise discount, cash sales to other than regular customers, and items chargeable to "Expense" account. *Contra* entries are not to be made on either side of this book, and the main column on the debit side is to show the exact amount of cash received while the main column on the credit side is to show the exact amount paid out. No "Cash" account is to be kept in ledger. The journal is to be used only for such entries as can not be conveniently made in the other books. Enter in the proper books the investments and the following transactions:

Jan. 2. Sold E. P. Dodge, Erie Pa. 4 half chests Japan tea, 240 lb @ 37½¢; 4 cases Ceylon, 200 lb @ 51¢; 2 bales Mocha coffee, 300 lb @ 30¢. Terms, $^2/_{10}$ $^n/_{60}$ (2% off if paid in 10 days, net if paid in 60 days). Bought books of account and stationery for office, cash $43.60. Cash sales to sundry persons $145.50

Jan. 3. Sold Lester Filkins, Oneida, 50 bbl. flour @ $6. Received in payment, cash $150 and Filkins's note at 10 days from this date, to balance. This note is discounted at Commercial National Bank [Compute interest at 365 days a year and charge the sum deducted from face of note to *Interest*]. Bought of James Darrow, New York, 10 half chests, 600 ℔ fine oolong tea @ 35¢; 8 bags, 1000 ℔ plain Rio coffee @ 24¢. Terms, $^3/_5$ $^n/_{60}$. Cash sales $175.50.

Jan. 4. Cash sales $237.50.

Jan. 5. Sold Smith & Peters, Syracuse, 20 bbl. 6500 ℔ granulated sugar @ 6¢. Terms $^1/_5$ $^n/_{30}$. Cash sales $186.50.

Jan. 6. Sold Jackson Haynes, Jamestown N. Y. 10 boxes premium chocolate @ $3.75. Terms, $^2/_{10}$ $^n/_{60}$. Bought of Deming & Co. Gloucester Mass. 200 kits no. 1 mackerel @ $2.80. Terms, $^3/_5$ $^n/_{30}$. Sent James Darrow N. Y. draft in payment of invoice of Jan. 3. Cash sales $90.

Jan. 7. Cash sales $243.25.

Jan. 9. Sent Deming & Co. N. Y. draft in payment of invoice of Jan. 6.

Jan. 10. Sold E. P. Edson, Elmira, 30 kits no. 1 mackerel @ $3.25. Terms, $^2/_{10}$ $^n/_{60}$. Smith & Peters sent N. Y. draft for bill of Jan. 5. Cash sales $125.

Jan. 12. E. P. Dodge paid bill of Jan. 2. Bought for heating store, 10 tons coal @ $6. Gave check. Cash sales $95.

Jan. 13. Sold A. L. Tomlinson, Albany, 50 kits no. 1 mackerel @ $3.25. Terms, $^2/_{10}$ $^n/_{60}$. Cash sales $126.50.

Jan. 14. E. P. Edson remits N. Y. draft for bill of Jan. 10. Cash sales $185.

Jan. 16. Commercial National Bank returns to Harper & Wells, unpaid, the note of Lester Filkins discounted Jan. 3; protest expenses $1.56. Received from A. L. Bostwick, Chicago, 100 bbl. pork on consignment. Sold the lot to Parker & Johnson, City, @ $10.90 a bbl. Received check. Our charges paid in cash are R. R. freight 12¢ a 100 ℔ (weight 20,000 ℔), cartage 8¢ a bbl. and we charge commission @ 2½% on gross sale. Net proceeds remitted this day by N. Y. draft. Paid billing clerk $18; assistant bookkeeper $15; office boy $6; printing $14.50; telegrams and postage $12.75. Cash sales $161.25.

Post sales ledger and general ledger. Make trial balance and show, through the "Loss and gain" account, the present capital of each partner. "Furniture and fixtures" account represents an *asset* and remains unchanged. Inventories: merchandise $4474.07; expense (coal on hand) $58.

**Keep this paper.** It will be used as the basis of questions in other examinations during the week.

## College Department

### 17TH BUSINESS EXAMINATION

# ADVANCED BOOKKEEPING

**Tuesday,** June 13, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer all questions. Double entry bookkeeping is implied.* **Ruled journal or ledger paper** *may be used, but the candidate will be* **held responsible** *for the ruling called for by the questions. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–10 George Eustace, wholesale dealer in dry goods and carpets, has a growing business in Syracuse. He receives a letter from John C. Traverse of Larchmont, a nephew, who, after completing his college course, has just returned from a long sojourn in Europe and now wishes to become a partner in the business of his uncle. He wants to begin as soon as possible and is ready to invest dollar for dollar in the business and take his full share of the work. After further correspondence an equal and unlimited partnership is formed under the name and style of Eustace & Co. Eustace invests his stock of goods, appraised by experts at $15,500, and furniture and fixtures at $1500. Traverse invests $17,000 cash, the partnership taking effect May 1, 1905. By mutual agreement the junior partner is to be at the head of the counting house, while the senior retains the general management of the business. The old business is to be settled by Eustace and a new set of books is opened by the firm.

The books of account are main ledger, sales ledger, purchase ledger, journal, cashbook, sales book and invoice book. The cashbook should have four money columns (each column ruled for dollars and cents) on both the debit and the credit page, for the easy handling of trade discount, cash sales to transient buyers and expense items. *Contra* entries must not be made in this book. The right hand column of the respective pages should show the exact amount of cash received and paid out. No "Cash" account (summary of cash footings) is to be kept in the ledger. The journal should be used only for such entries as can not be conveniently made in the other books. All original entries must contain sufficient explanation to make the transaction intelligible. Enter in the proper books the investments and the following transactions:

May 1. Sold M. Constance & Son, Elmira, 6 pc. 280 yd American dress silk @ $1.25; 3 pc. 150 yd English camel's hair @ $1.85. Terms, acceptance draft 10 days date, net. Bought books of account for cash $48. Cash sales to transient buyers $184.30.

May 2. Sold L. Peterson, Cortland, 4 pc. 162 yd English camel's hair @ \$1.85. Terms, $^2/_{10}$ $^n/_{60}$ (2% 10 days, net 60 days). Cash sales \$98.65.

May 3. Sold Wilkins & Son, Batavia, 1 pc. 50 yd fancy dress silk @ \$1.50. Terms, $^3/_5$ $^n/_{30}$. Bought of Barber Bros. New York, 40 doz. ladies' kid gloves @ \$7.75. Terms, $^2/_{10}$ $^n/_{60}$. Cash sales \$235.75.

May 4. Had M. Constance & Son's acceptance discounted at Commercial National Bank. [Compute interest at 6%, 365 days a year, and charge bank's deduction to "Interest."] Sold "C. O. D. Accounts" (E. M. Doyle, Owego) 5 pc. fancy ribbon @ \$2.25. Cash sales \$118.45.

May 8. Wilkins & Son remit N. Y. draft in payment of bill of May 3.

May 9. Bought of Jones Bros. Boston, 10 pc. 516 yd wool crepon @ \$1.50. Terms, $^3/_5$ $^n/_{30}$. Received C. O. D. remittance from E. M. Doyle. Cash sales \$215.

May 10. Sent Barber Bros. N. Y. draft for invoice, May 3. Bought office desk and chair \$162; gave check on Commercial National Bank. Cash sales \$145.60.

May 12. L. Peterson remits N. Y. draft for bill of May 2. Sent Jones Bros. N. Y. draft for invoice of May 9. Commercial National Bank returns to Eustace & Co. the acceptance of M. Constance & Son unpaid and protested. Expenses of protest \$1.81. Cash sales \$241.55.

May 13. Bought of Eames & Co. Philadelphia, 100 pc. duchesse lace @ \$2.25. Terms, $^2/_{10}$ $^n/_{60}$. Sold Williams & Baxter, Utica, 1000 yd Wilton carpet @ \$2.50. Terms, $^2/_{10}$ $^n/_{60}$. Cash sales \$65.40.

May 15. M. Constance & Son remit on account \$350. Paid for circulars and printing \$75, postage \$36, telegrams \$8.75, rent of store \$125. Cash sales \$205. [All disbursements under this date are chargeable to "Expense."]

Post sales ledger, purchase ledger and main ledger. Make a trial balance and show through the "Loss and gain" account the present capital of the partners. "Furniture and fixtures" represents an asset and should not be closed. The merchandise inventory is \$12,790.45.

**Keep this paper.** It will be used as the basis of questions in other examinations during the week.

## College Department

### 15TH BUSINESS EXAMINATION

## BUSINESS ARITHMETIC

### Tuesday, January 24, 1905—1.15 to 4.15 p. m., only

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*Answer 10 questions but* no more. *Answers in excess of the number required will not be considered. Division of groups is not allowed. Give all operations (except mental ones) necessary to find results. Reduce each result to its simplest form and mark it Ans. Compute interest at the rate of 6% for a year of* 365 **days,** *unless otherwise specified in the questions. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 **A park is 44 rods long and 36 rods wide. What will the brick cost @ $9.25 ⅌ M for a walk 6 feet wide around the outside of this park, the exposed surface of one brick being 4 by 8 inches?**

2 **An importer mixed 35 liters of wine costing 1.75 francs a liter with 48 liters costing 2.15 francs a liter. Did he gain or lose by selling the entire mixture @ $1.75 a gallon and how much? [1 liter=1.0567 qt.]**

3 Make out in proper form, under date of Jan. 3, 1905, a bill against H. J. Brown for the following goods sold him by The Excelsior Manufacturing Co., Hartford: 20 doz. punches @ $5.25; 150 special chucks @ $2.75; 225 agricultural wrenches @ 30¢; 18 bundles steel wire, 2750 ℔ @ 2¾¢.

4 A fruit dealer bought 450 crates of peaches @ 95¢ a crate. He sold 125 crates at a gain of 20%, 75 crates at a gain of 12%, 40 crates at cost, 190 crates at a loss of 10%, and the remainder was worthless. What was his net gain or loss?

5 A man owns a pile of wood 19.75 meters long, 2.5 meters wide and 3.2 meters high. What is the value of the wood @ 7.3 francs a stere (cubic meter)?

6 A commission merchant received a consignment of 460 barrels of flour. He paid freight $56, storage $15.80, cartage $14, cooperage $3.70. He sold 65 barrels @ $6.40, 185 barrels @ $6.45, 50 barrels @ $6.35 and the remainder @ $6.50. Commission for selling was 2%. What was the balance due the consignor?

7 On a note for $2500, dated Jan. 2, 1904, the following payments have been made: Mar. 25, $179.92; July 9, $375; Nov. 21, $500.78. At 5% interest how much is due today? [Solve by United States rule.]

8 A merchant offered a bill of goods for $758.50 with 90 days credit. What would be an equivalent cash offer when money is worth 6%?

9 A capitalist invested $50,088.25 as follows: $25,707 in U. S. 4's of 1907 @ 104⅛; $8160 in Mex. Cent. 4⅛'s @ 96; the remainder in manufacturing stock @ 85⅜ paying an annual dividend of 8%. What is his annual income from the investment?

10 An exporter sold through a broker the following bills of exchange: 8650 francs on Paris @ 5.18⅜; 15,000 marks on Hamburg @ 94⅜. What were his net proceeds, brokerage ⅛%?

11 A stock of goods was insured for one year for $18,500 @ ⅜%. At the end of 4 months the insurance company canceled the policy. What was the return premium? [Solve by proportion.]

12 An American importer bought in England 2500 yd. velveteen @ 9d a yd. The cost of the goods, with £5 for casing, is the amount subject to duty. Freight was $39.50 and duty 47⅛% ad valorem. The market value of a pound was 4.90. What was the total cost to the importer?

13 By the death of a relative in Philadelphia a resident of Naples becomes entitled to a legacy of $12,500. He orders the money sent to his agent in London who remits the proceeds to Naples. Exchange on London is quoted at 4.8775 in Philadelphia and the rate between London and Naples is 25.53 lire to the pound sterling. What amount does he realize from the legacy?

14–15 A, B and C form a partnership, investing $15,000, $10,000 and $8000 respectively, gains and losses to be shared according to investment. On Jan. 1 their books showed the following resources and liabilities: merchandise on hand $15,678.10, value of furniture and fixtures $1500, cash on hand $4710.15, notes and drafts outstanding $3960.50 with interest accrued $83.89, notes and acceptances due the business $5018.75 with interest accrued $157.10, sundry creditors $7213.25, sundry debtors $15,705.90. Show the loss or gain and the present worth of each partner by making a statement of the business.

## College Department

17TH BUSINESS EXAMINATION

# BUSINESS ARITHMETIC

**Tuesday,** June 13, 1905 — 1.15 to 4.15 p. m., only

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*Answer 10 questions but* **no more.** *Answers in excess of the number required will not be considered. Division of groups is not allowed. Give all operations (except mental ones) necessary to find results. Reduce each result to its simplest form and mark it Ans. Compute interest at the rate of 6% for a year of* **365 days,** *unless otherwise specified in the questions. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 A grocer bought 10 bushels of chestnuts @ $3.65 a bushel and retailed them at 6¾¢ a pint. What was his per cent of gain?

2 How many liters of water can be contained in a cistern that is 2.5 meters long, 2.2 meters wide and 3 meters deep? How much will it cost to plaster the sides and bottom of this cistern at 1.25 francs a square meter?

3 A gas fitter buys a bill of goods amounting to $965 list price. He is offered discounts of 10, 10 and 5 with 60 days credit or 25% off for cash. How much would he gain or lose by borrowing money at 6% to pay cash?

4 A farmer sold a load of wheat weighing 2490 ℔ @ 95¢ a bushel, a load of oats weighing 1864 ℔ @ 36½¢ a bushel and a load of barley weighing 2160 ℔ @ 44¼¢ a bushel. How much did he receive in all?

5 Bought 3 building lots, each 25 feet front, at $50 a front foot and leased them at $6 a foot. Paid $5625 for a house and lot from which I realized 8% on the cost after allowing for expenses, taxes etc. What is my annual income? What is the rate of income on my total investment?

6 An importer bought 77¾ meters of silk in Lyons @ 6.5 francs a meter; duties and other charges were $68.76. How much should he charge a yard to gain 15% on the total cost, when exchange is at par?

7 A rectangular field, which is twice as long as it is wide, contains 2048 sq. rd. How much will the lumber and posts cost for a fence 4 boards high around this field if the boards are 6″ wide and cost $25 ℘ M and the posts, which are set 8 feet apart, cost 12¢ apiece?

8 A firm failed with liabilities amounting to $49,251. The assignee sold warehouse and 2 building lots for $30,750 and the

other assets netted $2754.08. Expenses for settling were 2% of the assets. How much can they pay on a dollar and what should a creditor receive whose claim is $5760?

9 A commission merchant sold 75 bales of cotton averaging 475 ℔ @ 15¾¢ a ℔ and charged 12½¢ a bale commission; other charges were $165.10. He bought for the consignor 8000 bushels corn @ 45¢ a bushel, charging 3% commission. What amount should be remitted to the consignor?

10 A Boston importer buys 5246 pounds of wool from a London merchant, @ 1s 3d a pound. What would be the duty in United States money if the specific duty is 10¢ a ℔ and the ad valorem duty 11%?

11 What is the present worth of a debt which would amount to $1595.40 in 73 days from date at 4%?

12 The assessed valuation of the property in a certain town is $2,249,260. The amount levied for public improvements was $16,869.45. What is the rate of taxation? What is the amount paid on property valued at $15,960, the collector's fee being 1%?

13 An apartment house was insured as follows: Company A $3000, Company B $9000, Company C $12,000. The building was partially destroyed by fire. The damage was repaired by the companies at a cost of $9600. What amount is paid by each company?

14–15 A broker wishes to close up Henry Miller's account. From the following skeleton complete the account and show how much is due Miller; also his gain on the speculation:

HENRY MILLER

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1905<br>June | 5 | To 100 shares Pa. R. R. @ 50¼ ............... | | 1905<br>June | 5 | By cash (margin)..... | 5000 |
| | | To 400 shares Lake Shore @ 93¼ ........ | | | | By 25 days interest on margin............... | |
| | | To 200 shares W. U. Tel. @ 102........... | | | 30 | By 100 shares Pa. R. R. @ 53⅞ ............... | |
| | | To ⅛% brokerage, 700 shares (buying)..... | | | | By 400 shares Lake Shore @ 99¼ ........ | |
| | 30 | To 25 days interest on cost and brokerage. | | | | By 200 shares W. U. Tel. @ 105¼ ......... | |
| | | To ⅛% brokerage, 700 shares (selling)..... | | | | | |

## College Department

### 15TH BUSINESS EXAMINATION

# COMMERCIAL LAW

### Wednesday, January 25, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer 10 questions but* no more. *Answers in excess of the number required will not be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 What is law? Mention *five* different sources of law in the United States.

2 Mention *five* requisites of every binding contract.

3 A broker has orders to sell the stock of a customer at par, but sells it at a premium. May he retain the excess? State the principle.

4 State the general principle of the law touching the contracts of minors. May a minor become a partner with adults in any kind of business, and if so would his obligations be the same in all respects as those of any other partner? Explain fully.

5 A buys and pays for a patent which he supposes is very valuable. It afterward appears that the patent had been set aside as void before the purchase. What remedy, if any, has he? Why?

6 B, meeting C on the street, tells him to send to his place of business 15 barrels of a certain brand of flour which C has on hand, at $5 a barrel. The men separate without further talk, and the next day the flour is sent to B. Is he obliged to take it? Give reasons.

7 D of New York writes, March 6, to E of Jackson, offering $3 a box for 200 boxes oranges of a certain brand and E writes an acceptance, March 10, which is mailed at 9 a. m. of that day. On the same day D telegraphs at 9.30 a. m. withdrawing the offer. Is there a binding contract? State the principle.

8 A firm is dissolved by the retirement of one of the three partners, the two who remain agreeing in writing to assume all responsibility for outstanding firm debts. Before these are paid a disastrous fire and the failure of an insurance company render the new firm hopelessly insolvent. Can the retired partner be held for any part of the debts? State the principle.

9 F orders certain goods of G, who, unknown to the orderer, had sold his entire business, including accounts, to H. H fills the order without notifying F of the change, and the goods were consumed by the purchaser without notice of the facts. Can H recover the price of the goods? State the principle.

10 Distinguish clearly and fully between assignability and negotiability. Mention (*a*) a negotiable instrument, (*b*) an assignable instrument that is not negotiable.

11 J has given a note to K, and for the purpose of renewing it signs a note in blank and sends it to K, telling him to fill it out to cover principal and accrued interest. K fills out the note for twice the amount and sells it in due course to one who knows nothing of the circumstances. What is the extent of J's liability to the holder of the note? Why?

12 L pays a note which apparently bears his signature as maker. Later he finds that the signature was forged. May he recover the money paid? State the principle.

13 Is the compromise of a disputed right or claim a sufficient consideration to support a promise? Would your answer be the same if the claim proved to be in fact unfounded, though the promisee had reasonable grounds to believe it just?

14 What is a chattel mortgage? In what does such a mortgage differ from a pledge of chattels? If a chattel mortgage is intended by the parties to cover the stock of goods and the fixtures in a certain store, and by an oversight in drawing the mortgage the fixtures are not mentioned, can the mortgagee be permitted to prove the real intent, so that the mortgage may cover the fixtures? State the principle.

15 What leases must be in writing? Mention *three* classes of articles, annexed to the realty by the tenant, that may be removed by him before the expiration of the term, and state the condition that must govern such removal.

## College Department

### 17TH BUSINESS EXAMINATION

# COMMERCIAL LAW

**Wednesday, June 14, 1905 — 9.15 a. m. to 12.15 p. m., only**

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*Answer 10 questions but* **no more.** *Answers in excess of the number required will not be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 What is meant by the word "law" in its broadest sense? Mention *three* original sources of law enforcible by courts. Distinguish between moral law and technical or positive law. Define equity.

2 What is a contract? Mention *five* essentials of a valid contract.

3 Distinguish between formal and informal contracts. What other names are sometimes given to formal contracts? What are the advantages of a formal contract? What kind of contract is most common?

4 A owes B $250. A offers his negotiable note at 60 days for $175, in full settlement, which B accepts. May B still maintain an action to recover the $75 unpaid? What is the principle involved?

5 C wishes to buy goods on credit of D, who demurs to selling them except for cash; whereupon E, who is favorably known to D, says, "If he does not pay I will." Is E bound? State the principle.

6 F agrees orally to buy a town lot of G and pays the price agreed on, with the understanding that the land will be conveyed to him on the following day. G refuses to give a deed. Has F a remedy, and if so what? State the principle involved.

7 What is the legal rate of interest on ordinary loans of money in the State of New York? Are bankers empowered to take a higher rate on discounting ordinary paper? Under what conditions, if any, may a banker take whatever rate of interest is agreed on with the borrower? What are the penalties for taking usurious interest?

8 The parents of an infant six years of age deed real estate to her and the deed is delivered and recorded. Ten years later the parents deed the same property in trust to another, the in-

fant signing the mother's name at the mother's request. Who is entitled to the property? What principles are involved?

9 What is a bill of lading? Is it a negotiable instrument? What is a carrier's lien and how may it be extinguished?

10 H, who has over $1000 in a certain bank, delivers to J in payment of a debt a check for $95.75. During regular banking hours J presents the check for payment, which is arbitrarily refused. May J sue the bank for the amount? What rights, if any, has H against the bank for the dishonor of his check?

11 In what ways may a partnership be formed? In an ordinary partnership to what extent may a partner bind the firm as to (*a*) making sales of firm merchandise, (*b*) incurring debts?

12 K executes and delivers to L a promissory note for $4500, in the body of which is a statement that it was given for money loaned. The note was in reality given for boarding, nursing and caring for K when he was sick and till he died, and the real consideration was duly performed. May either party show the actual consideration? May L recover on the note? State the principle involved.

13 What is the statute of limitations and on what policy is it founded? When would the statute begin to run on a promissory note payable on demand? How long would it run? What would be the effect of a partial payment on the note at any time during the running of the statute? What would be the effect of a new promise to pay after the debt was outlawed?

14 M writes N as follows: "Upon an agreement to finish the fitting up of offices 158 Main in two weeks from date you can commence at once." N, determining to accept, buys the necessary lumber and begins to prepare it; but before he has done anything to communicate acceptance M withdraws the offer. Has N a right to finish the work? If not, can he recover for what has been done? What is the principle?

15 O, a harness maker who has never sold his wares outside of Otsego county, sells his lease, stock, tools and good will to P, and for a valuable consideration agrees that he will not for 10 years engage in that kind of business in the State of New York. Is he legally bound by this agreement? State the principle.

## College Department

15TH BUSINESS EXAMINATION

# COMMERCIAL GEOGRAPHY

**Thursday, January 26, 1905—9.15 a. m. to 12.15 p. m., only**

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*Answer 10 questions but* **no more.** *Answers in excess of the number required will not be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Describe in detail some productive industry of which you have direct *personal knowledge.* Show how the product is disposed of.

2 Give the location and mention *one* leading product of each of 10 of the following cities of New York state: Auburn, Buffalo, Corning, Dunkirk, Elmira, Geneva, Johnstown, Little Falls, Niagara Falls, Olean, Schenectady, Troy, Yonkers.

3 Answer the following regarding the earth: What is its circumference? diameter? area (in square miles)? curvature for one mile? approximate distance from the sun in the summer and in the winter?

4 State the meaning and give an example of *each* of the following: coast plain, marine plain, alluvial plain, flood plain.

5 Give *three* reasons for the route of the Erie canal as constructed. How was the great west benefited by this waterway? How were New York state and New York city affected by it?

6 Mention the five countries that produce rice most extensively. How does this cereal rank, as to (*a*) numbers consuming it, (*b*) commercial importance?

7 Show, in a paragraph not exceeding 100 words, that commerce is necessary to the comfort and happiness of the world.

8 Why are the vineyards of Cape Colony and the peach orchards of New Zealand planted on northern slopes, while those of the United States and Canada are planted preferably on southern slopes?

9 In what ways have rivers aided commerce? Give *two* illustrations.

10 Mention in order of quantity grown the five countries that lead in wheat-growing. What is the average yield of wheat an acre, in the United States, Denmark, Russia?

11 Describe *three* effects of cutting down large areas of forest.

12 State as to sugar (*a*) what country is the largest producer, (*b*) what vegetable supplies the largest output, (*c*) what was approximately the total supply in 1900, (*d*) what quantity was consumed by the United States and how much *per capita*.

13 Mention the class of American representatives abroad specially charged with looking after American commercial interests. State *three* important services that they are expected to perform under this charge.

14 With what country does the United States trade most extensively? Mention *four* leading articles sent by the United States to that country and *four* leading articles received in return.

15 Describe the production of silk, showing what is done by (*a*) the insect, (*b*) man. What country is the largest producer of silk and what ratio does the product bear to the world's total product?

## College Department

### 17TH BUSINESS EXAMINATION

# COMMERCIAL GEOGRAPHY

**Thursday,** June 15, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer 10 questions but* no more. *Answers in excess of the number required will not be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Describe in detail some productive industry in your vicinity with which you have personal acquaintance. Show why the place selected is well adapted to this production and describe the manner of disposing of the product.

2 Show the importance of the Hudson and Champlain valley and the Mohawk gap in the movement of population and the development of commerce.

3 What is the present condition of the flour-milling industry in New York and the eastern states as compared with that of 30 years ago? Give at least *two* reasons for the change.

4 What is the original source of all things required by man? Can he live in comfort by these things in their natural condition? If not, what is the chief agent employed to fit raw materials for man's use?

5 Pittsburg is a notable center for iron and steel manufactures; why? Some of the very largest factories have been recently established on the south shores of Lake Erie and Lake Michigan; for what reasons?

6 Of the world's annual output of cotton what proportion is grown by the United States? What proportion, approximately, of the United States cotton is used at home, what proportion is sent to England and what to the rest of the world?

7 What effect has the great western highland of the United States on the central plain, and what is the economic significance of the phenomenon? Mention *one* similar phenomenon in Europe or in Asia.

8 In 1860 steel was selling at about $125 a ton; the price of a ton of Bessemer steel billets now is considerably less than one sixth of that sum. Show how transportation has been cheapened and commerce enlarged by the new process of steelmaking.

9 Name *two* countries that might live comfortably on their own productions. Would it be advantageous or economical for them to pursue such a policy? Explain.

10 What important service to agriculture, commerce and navigation is rendered by the Weather Bureau?

11 What portions of the earth contain the great centers of the world's activities and economies? Give reasons for your answer.

12 Give reasons for the slow development of Central America and South America as compared with that of the United States and Canada.

13 Show by map or otherwise the location of the Suez canal. What two large bodies of water does it connect? How much, approximately, has this canal shortened for steamships the route between London and Bombay as to (*a*) time, (*b*) distance?

14 Mention *four* important regular imports of England from the United States and *one* import that is just beginning.

15 What is the most important export crop of Germany? How is the industry encouraged? How does Germany rank with other countries as to exports of iron and steel?

## College Department

### 15TH BUSINESS EXAMINATION

# HISTORY OF COMMERCE

**Thursday, January 26, 1905—1.15 to 4.15 p. m., only**

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*Answer 10 questions but* **no more.** *Answers in excess of the number required will not be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 From what circumstances did commerce originate? What was the nature of the earliest trading?

2 What advantages to development and commercial growth closely followed the early human migrations?

3 Show the industrial advantages of the Tigro-Euphrates region. How did it compare with the Nile valley? Touch briefly on the two great Assyrian cities and their banking system.

4 Give an account of the early commercial travelers, touching on (*a*) characteristics, (*b*) methods of trade, (*c*) discoveries, (*d*) influence.

5 Write from 75 to 100 words on the ancient Hebrews as a commercial people.

6 Show why the Greeks became naturally a maritime and commercial people. Mention *five* countries in which Greek colonies were planted.

7 Describe the condition of European commerce in the so called Dark Ages.

8 Describe the rise of the Mohammedan Empire and mention *five* cities that enjoyed great commercial prosperity under that empire.

9 Give an account of the rise of the Netherlands from A. D. 678 to the close of the Middle Ages. What was the principal labor-saving machine?

10 What were commercial leagues and why were they formed? Mention *two* of the earlier leagues and give the names of *two* important cities allied in each.

11 Show how England became the leading country in the growth of wool, and later in its manufacture.

12 What was the principal aim of Pitt in his management of the Seven Years War? What was the general result?

13 Show that the Federal Constitution was an outgrowth of the industrial and commercial needs of our country.

14 What action of foreign nations led to the Embargo Act and later to the Non-intercourse Act? State the effect of these acts on (*a*) American commerce, (*b*) American manufactures.

15 Mention *five* important economic effects of the discovery of gold in California.

## College Department

17TH BUSINESS EXAMINATION

# HISTORY OF COMMERCE

**Thursday,** June 15, 1905—1.15 to 4.15 p. m., only

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*Answer 10 questions but* no more. *Answers in excess of the number required will not be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Show in about 100 words how primitive man maintained his existence before the art of cultivating the ground or of domesticating animals was known.

2 How were the goods of the early merchants usually transported? What plan of travel prevailed and for what reasons?

3 What conditions led the Phenicians to pursue a commercial and seafaring life? What people were closely allied to them in overland trade? What was the policy pursued by the Phenicians for extending their maritime commerce? Mention *two* causes of their commercial decay.

4 Give an account of the commerce of ancient Rome, touching on (*a*) extent of exports and imports, (*b*) adjustment of balance of trade. Explain fully.

5 Show the effects of the Hanseatic League on civilization. What was its greatest aehievement?

6 Show how Spain missed the opportunity for commercial supremacy on two continents.

7 What was done by Henry 7 of England in the interests of exploration and commercial development?

8 Sketch the economic policy of England toward her American colonies and show why it ended in revolution.

9 The so called "industrial revolution" in England caused much suffering and many riots; why?

10 Show (*a*) why the Articles of Confederation were insufficient for the government of the United States, (*b*) how the clashing of state tariffs became the dominant reason for enacting the Federal Constitution.

11 Write about 100 words on the rise and decline of the American merchant marine.

12 Trace the growth of transportation facilities in the United States.

13 During the period of 34 years ending 1873 the annual imports of England showed an increase of 496% and the annual exports an increase of 379%. Account for this growth.

14 What important changes in the control and management of railways have taken place since 1850? Why do not the railways charge the same ton-mile rate for carrying freight regardless of the length of the haul?

15 Mention the economic causes of the American Civil War. From an economic point of view has the war proved an injury or a benefit to the country as a whole? Give reasons for your answer.

## College Department

15TH BUSINESS EXAMINATION

# BUSINESS PRACTICE AND OFFICE METHODS

**Wednesday, January 25, 1905 — 1.15 to 4.15 p. m., only**

*Answer 10 questions but* **no more.** *Answers in excess of the number required will not be considered. Division of groups is not allowed. All accounts, bills and statements must be correctly ruled. Credits depend on accuracy of answers and neatness of papers. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Make a balance sheet from a ledger that contained the following open accounts after 15 days of business:

| | | |
|---|---|---|
| Cash | $8418 76 | $2363 86 |
| Peter B. Burns, partner | | 9000 |
| Alfred E. Paine, partner | | 3000 |
| Furniture and fixtures | 450 | |
| Bills receivable | 1000 | |
| Interest | 25 | |
| Commission | | 27 25 |
| Mdse. discount | 11 49 | 30 30 |
| Expense | 169 85 | |
| James Addington | 151 56 | |
| Mdse | 7060 | 3040 50 |
| Accounts receivable | 1269 50 | 1069 50 |

Inventories: merchandise $4474.07; expense $58. Losses and gains are shared by the partners in proportion to investment. Furniture and fixtures, an asset, stands unchanged.

3 Referring to questions 1–2, state (*a*) the per cent of gain on merchandise, (*b*) the per cent of gain on capital, (*c*, *d*, *e*) whether or not the business is sufficiently prosperous to be continued, giving reasons for your answer.

4 A well dressed man comes to your store and buys $380 worth of goods, to be shipped at once to Nouville, his place of business. He hands you in payment a draft, Nouville Bank on Traders' Exchange Bank, New York for $500. What would you do? State your reasons.

5–7 C. E. Partridge & Co., commission merchants, Chicago, doing their banking business with the Continental Bank, with which they are in good standing, buy for Flint & Steel, Rochester, 2300 bu. wheat at a cost of $1.18 a bu. f. o. b. They ship *by "Pink Line"* @ *7¢* a 100 ℔, cars 1640, 76, 1215, 306 and 920.

Make out all the papers necessary to enable Partridge & Co. to secure immediate credit at the bank for amount of purchase.

8 State how you would proceed to open an account with a commercial bank. Make out a deposit ticket for $155 currency, a check for $235.50, a bank draft for $147.50 and an individual draft for $400.44 less collection ⅛%, for deposit in Commercial National Bank, Rochester.

The following questions are based on the paper in **advanced bookkeeping:**

9 Draw the note made by Abner Wells, showing indorsement. Mention the general name of this note in the hands of (*a*) the maker, (*b*) the firm. [See investments.] Make out the draft sent to Bostwick—Commercial National Bank, Rochester, E. A. Helmer, cashier, on Produce Exchange Bank, New York. Show how this draft is obtained. [Transaction Jan. 16.]

10 Write the note given by Filkins. What should be done by the firm when this paper is returned by the bank unpaid? What entry should be made, and in what book or books? [Transactions Jan. 3 and 16.]

11 Enter in consignment ledger the details of the transaction with A. L. Bostwick, Chicago. [Transactions Jan. 16.]

12 Make an account sales of the merchandise sold for Bostwick. [Transactions Jan. 16.]

13 As bookkeeper, how would you keep the record of a firm's cash on deposit in bank? Parker & Johnson pay by check on Granite National Bank for 100 bbl. pork. [See transactions Jan. 16.] Assuming Parker & Johnson's balance in bank to be $3225.75, draw the check with stub attached, showing the entries thereon.

14–15 Write and balance the bank pass book of Harper & Wells with Commercial National Bank. All funds invested or otherwise received, except cash paid for books etc. Jan. 2 and cash sales for Jan. 16, $161.25, have been deposited, and all payments except for books, Jan. 2, have been made by check. None of the checks of Jan. 16, except those given for Filkins's protested note and for net proceeds of Bostwick sale, have been paid by bank. Does the balance shown by the bank's books agree with that shown by the firm's check book, and if not, what is the difference and why does it occur?

## College Department

17TH BUSINESS EXAMINATION

# BUSINESS PRACTICE AND OFFICE METHODS

**Wednesday,** June 14, 1905 — 1.15 to 4.15 p. m., only

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*Answer 10 questions but* no more. *Answers in excess of the number required will not be considered. Division of groups is not allowed. All accounts, bills and statements must be correctly ruled. Credits depend on accuracy of answers and neatness of papers. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Make a balance sheet from a ledger that after 15 days of business showed the following open accounts:

| | | |
|---|---|---|
| Cash | $19,864.29 | $2138.64 |
| Alvah Parker, partner | | 17000 |
| George T. West, " | | 17000 |
| Mdse | 16809 | 5023.15 |
| Furniture and fixtures | 1662 | |
| Interest | .62 | |
| George Bowker & Co | 629.31 | 350 |
| Trade discount | 8.24 | 29.42 |
| Expense | 292.75 | |
| Accts. receivable | 3513.45 | 1013.45 |
| Accts. payable | 1084 | 1309 |

Mdse. inventory $12,790.45. Losses or gains shared equally. Furniture and fixtures, an asset, is unchanged.

3 Referring to questions 1–2, state (*a*) the per cent of gain on merchandise, (*b*) the per cent of gain on capital, (*c*, *d*, *e*) whether or not the business shows sufficient prosperity to be continued, giving reasons for your answer.

4–5 As a commission merchant doing business in Little Falls N. Y. you receive from Marsh & Co., Danville Ill. five cars corn, weight 140,350 lb, to be sold for their account. They make a sight draft on you @ 35¢ a bu., which you pay April 28. You sell the corn for cash (weight as billed) @ 55¢ a bu. on May 18. Your charges are freight paid @ 10¢ a 100 lb, switching cars $3, your commission 1¢ a bu. and interest (at 6% 365 days a year) on the money advanced on sight draft.

Giving the name of the book, show the page containing your first entry of the consignment, with such details as are afterward added, and show in any other book or books such record of the transaction as may appear.

6 Make out an account sales of the corn mentioned in questions 4–5.

7 Mention the important particulars in which the following differ: (*a*) bill of lading for property shipped on the Great Lakes, (*b*) bill of lading for property shipped by Erie canal, (*c*) railway receipt or bill of lading for property shipped, (*d*) express receipt for property shipped.

8–9 Show the ruling and write out the column headings of a bills receivable book from which postings are to be made direct to the ledger. Enter on this book the paper mentioned in the transactions of May 1, advanced bookkeeping paper.

The following questions are based on the paper in **advanced bookkeeping:**

10 Write such a description as would cover in a fire insurance policy the goods and furniture and fixtures in the store of Eustace & Co., their building being known as 118 Redjacket st. [See first paragraph, advanced bookkeeping paper.]

11 Write the draft on M. Constance & Son, showing acceptance and computing the interest deducted when the paper was discounted. [See transactions May 1 and May 4.]

12 Explain the process of shipping goods C. O. D. by express, making out the paper that should accompany the goods in the case of the C. O. D. shipment mentioned in the transactions of May 4 and giving the chief objects of this way of shipping.

13 What should be done by Eustace & Co. when the paper of Constance & Son is returned dishonored? What entry should be made and in what book or books? [See transactions May 12.]

14–15 Write and balance the pass book of Eustace & Co. with Commercial National Bank. All funds invested or otherwise received, except $48 for books May 1 and cash sales for May 15, have been deposited and all payments except for books have been made by check. None of the checks drawn May 15 have been paid by the bank. Does the balance shown by the bank's books agree with that shown by the firm's check book, and if not, what is the difference and why does it occur?

## College Department

### 15TH BUSINESS EXAMINATION

## BUSINESS ENGLISH

**Friday, January 27, 1905 — 9.15 a. m. to 12.15 p. m., only**

*Answer questions 1-3 and seven of the others but* **no more.** *Answers in excess of the number required will not be considered. Division of groups is not allowed. Every letter is to be formally addressed to some person or firm and to be formally signed by the writer unless otherwise directed. All answers will be rated as to spelling, punctuation, capitalization and neatness, and also as to correct use of words, sentence structure, logical sequence of ideas, paragraphing and general intelligence. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

**1-3 State in an essay of 350 to 600 words (limitations to be strictly observed) the necessary qualifications, general and special, for a bookkeeper in a business office. Devote at least one half of the essay to a clear explanation of the manner of using the different books mentioned in the third paragraph of the advanced bookkeeping paper and to a practical illustration of a method of recording and treating a consignment of goods to be sold on commission. [See transactions Jan. 16, advanced bookkeeping.]**

*Or*

Candidates taking the stenographer's course may write from 350 to 600 words on the qualifications that should be possessed by an amanuensis in a business office, including the work that may justly be required and a description of the different apparatus and appliances and the manner of using them.

4-5 Express the following extract in correct idiomatic English, underlining all corrections made and giving reasons for all changes:

In loaning funds on demand where it is strictly understood between bank and loanee that the money so advanced is positive minute money — money returnable at any minute, when the bank calls for it — banks charge low rates of interest most generally. When interest rates are large, banker's choose to deal in long time paper. This general rule is the other way when the situation is reversed. Bankers also aim to scatter and locate their maturities so that as the seasons roll round they will not possess very great amounts maturing at one time and very small at another. They also plan to be "in funds" at these seasons when there are always large and profitable demand for money. For instance in the cotton manufacturing centers the banks count on a large demand for money between October and January when the bulk of the purchases to supply the mills are made. The wheat and corn crops are autumn consumers of money.

**The following questions are based on the paper in advanced bookkeeping:**

6 Write under date of Dec. 5, 1904, the letter of Wilson Harper to Abner Wells. This letter should not be a formal business letter, but should indicate the affectionate and respectful feeling of the men for each other while giving clear reasons for the business proposition. [See first paragraph, advanced bookkeeping paper.]

7 Write under date of Dec. 8 the reply of Wells. This letter should be very friendly, manifesting the joy the proposition has given, accepting the offer and stating the amount and kind of investment the writer is prepared to make. [See first and second paragraphs.]

8 Write under date of Dec. 27, 1904, a letter of Wilson Harper to James Darrow, New York, advising him of the change about to be made in the Rochester house and asking for a discount of 3% if paid in five days, on a large bill of tea and coffee about to be ordered.

9 Write, Dec. 29, 1904, the answer of Darrow, congratulating the members of the new firm and also granting the request for special discount and making it regular for the future.

10 Draw up, in simplest form and language, articles of copartnership between Harper and Wells and show the proper execution thereof. [See second paragraph.]

11 Write an attractive circular announcing the new firm of Harper & Wells.

12 E. P. Dodge makes a claim for damage to one bale Mocha coffee by wetting. Write him under date of Jan. 7, 1905, a letter showing that the railway company is responsible for the damage because it occurred while the goods were awaiting transportation in the company's freight house.

13 Write under date of Jan. 10, a letter addressed to Abner Wells by A. L. Bostwick, his former employer, asking if the Rochester firm will undertake the sale, on commission, of 100 bbl. ungraded pork. [Transactions Jan. 16.]

14 Write under date Jan. 16, a courteous letter to A. L. Bostwick. Refer particularly to the papers you send to close up the pork transaction. [Transactions Jan. 16.]

15 Write to Lester Filkins, Oneida, such a letter as the circumstances seem to demand, and write also the reply of Filkins. [Transactions Jan. 3 and 16.]

## College Department

### 16TH BUSINESS EXAMINATION

# BUSINESS ENGLISH

**Thursday,** March 30, 1905—1.15 to 4.15 p. m., only

*Answer questions 1-3 and seven of the others but* **no more.** *Answers in excess of the number required will not be considered. Division of groups is not allowed. Every letter is to be formally addressed to some person or firm and to be formally signed by the writer unless otherwise directed. All answers will be rated as to spelling, punctuation, capitalization and neatness, and also as to correct use of words, sentence structure, logical sequence of ideas, paragraphing and general intelligence. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1-3 Write an essay of 250 to 400 words (limitations to be strictly observed) on the qualifications and duties of the modern bookkeeper. Devote at least half of the essay to an explanation of the advantage of having four money columns on each page of a cashbook and to the manner of using a sales ledger and of showing the results in the main ledger.

*Or*

Candidates taking the stenographers course may write 250 to 400 words on the duties and on the education and other general and special qualifications necessary for the amanuensis in a business office, including a description of the apparatus and appliances that such amanuensis should be able to use and of the manner of their use.

4 Write a letter of application in reply to the following:

> WANTED—First class stenographer and typewriter. Address, stating education, experience and salary, A. L. B. Journal office.

5-6 Rewrite the following with a view to correct English, good taste and brevity, and give reasons for changes made:

A corporation is a body, consisting of, usually, several persons, having power given to them by law to do things the same as one person, and continued by a succeeding of new members. Public corporations are the kind which are made up for the public interest, like cities, town, counties, etc. Private corporations are got up, wholly or partly, for the aggrandizement of those who hold the shares, as railway corporations, etc. Corporate bodies of which the members at discretion fill by appointment all vacancies accruing in their membership sometimes are called close corporations. In the United States the power to be a corporation is a franchise, which can only exist through the legislature. There are two distinctive methods in which corporations may be called into being: first by specifical grant of the franchise to the members; and second by General Grant which becomes operative in favor of particular persons when they organize on purpose to avail themselves of its provisions.

Questions 7 to 15 are based on the following statement:

Walter Stillman, chief clerk for Breed & Foster, wholesale grocers, Albany, writes, July 28, 1904, to his friend John Chester, Butte City, Mont. where Chester owns some mining properties. Stillman says that his firm is about to sell out and retire and urges Chester to join him in the purchase, which he says will yield a fine income. As a result of the negotiations, Chester satisfactorily arranges his mining interests and the men form an unlimited partnership under the name of Stillman & Chester. Breed & Foster agree to sell the entire stock on hand for $12,000 and the goodwill for $4000, the amount to be paid half in cash and half in approved notes. Further details appear in the transactions noted below.

Aug. 12. Stillman invests cash $3000 and his note (secured by real estate mortgage) $4000, this date, payable to the order of the new firm, six months after date, with interest; Chester invests cash $10,000. The new firm opens an account with the Commercial National Bank and deposits $13,000 cash. The old firm surrenders the business and receives in full payment certified check $8000, the note of Walter Stillman indorsed by Stillman & Chester, and note of Stillman & Chester $4000, payable one year after date with interest.

Aug. 15. Sold H. T. Williams, Jamestown, goods amounting to $340. Terms, $^2/_5$ $^n/_{60}$.

Aug. 19. H. T. Williams sends in payment of his bill a promissory note of R. T. Leicester, Albany, $250, payable to Williams or order at Farmers Bank, Albany, Aug. 20, and a N. Y. draft $83.20 to balance, both instruments being deposited as cash in Commercial National Bank.

Aug. 22. Commercial National Bank returns Leicester's note protested for nonpayment; expenses of protest $1.52.

Aug. 23. Sold H. T. Williams goods amounting to $644.95. Terms, $^2/_5$ $^n/_{30}$.

Aug. 26. H. T. Williams remits for bill of Aug. 23 and for Leicester's protested paper, with expenses. He also sends $6.80, discount heretofore allowed on first bill, which last sum is at once returned.

7 Write, July 28, 1904, as Walter Stillman to John Chester such a letter as you would send to a trusted friend with whom you wished to go into business. This letter should contain about 125 words. [See statement following questions 5–6.]

8 Write as Chester to Stillman, Aug. 4, such a reply as might be expected from a warm friend who favored the proposition made, and believed that he might accept it. Ask the necessary questions about the business and the capital required. [See statement.]

9 Write, Aug. 10, Stillman's reply to Chester's questions and such other matter as may seem necessary. [See statement.]

10–11 Draw up, in simple form and language, articles of agreement for the copartnership of Stillman & Chester, showing proper execution. [See statement, transactions Aug. 12.]

12–13 Write an attractive circular letter to be sent out by Stillman & Chester to customers of the old firm and to the trade. Call attention to the long and successful services of Stillman. Write also, to accompany this circular, a letter of Breed & Foster, cordially recommending the new firm.

14–15 Write as Stillman & Chester to H. T. Williams, Aug. 23, mentioning protest of Leicester's note and stating what has been done about it. Give such information as you can as to the responsibility of the maker of the note. [Transactions Aug. 19 and 22.]

## *University of the State of New York*

## College Department

17TH BUSINESS EXAMINATION

# BUSINESS ENGLISH

**Friday,** June 16, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer questions 1-3 and seven of the others but* **no more.** *Answers in excess of the number required will not be considered. Every letter is to be formally addressed to some person or firm and to be formally signed by the writer unless otherwise ~~directed.~~ All answers will be rated as to spelling, punctuation, capitalization and neatness, and also as to correct use of words, sentence structure, logical sequence of ideas, paragraphing and general intelligence. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1-3 Write an essay of not less than 250 nor more than 400 words on the essential qualifications of the modern bookkeeper. Devote at least half of the essay to a clear explanation of the scheme of bookkeeping called for in the advanced bookkeeping paper on which this business English paper is mainly based.

*Or*

Candidates taking the stenographers course may write from 250 to 400 words on the education and other general and special qualifications necessary for the amanuensis in a business office, devoting about half of the essay to a description of the apparatus and appliances that an amanuensis should be able to use, with a clear account of the process of using them.

4 Write under date of April 19, 1905, as Traverse to Eustace, a letter proposing partnership. This letter should contain at least 125 words and should give in some detail reasons for wishing to form such partnership. Its tone should be respectful, friendly and enthusiastic. [See first paragraph, advanced bookkeeping paper.]

5 Write, April 22, Eustace's reply to Traverse based on the following outline: nephew has no knowledge of business; has no experience; what inducement would the writer have for giving up half his business? The tone of the letter should be bluff but not unfriendly.

6 Write as Traverse to Eustace, April 24. This letter should state that the writer has been a close observer and has given great attention to the dry goods trade in all the chief European markets. Give some detailed statements.

7 Write, April 25, as Eustace, a telegram requesting Traverse to come to Syracuse and bring with him a man thoroughly acquainted with values in the dry goods and carpet trade.

The following questions are based on the paper in **advanced bookkeeping:**

8 Write the certificate of three appraisers who have passed on the value of the merchandise and furniture and fixtures in the store of Eustace. The appraisers are John Jones, Abner Ames and Paul Ott. Date of certificate April 28, 1905. [See first paragraph.]

9 Draw up in simple form and language articles of partnership between Eustace and Traverse, showing execution. [See paragraph 1.]

10 Write an attractive circular announcing the new firm and its enlarged facilities for business. [Paragraph 1.]

11 Write, April 29, the letter of M. Constance & Son which resulted in the transaction of May 1. This is the first order from this firm. A recommendation from Chemung Bank accompanies the letter. Write this recommendation. [See transactions May 1.]

12 Write as Eustace & Co. May 9, to Williams & Baxter, Utica, offering a large invoice of Wilton carpets of certain numbers, giving price and terms if accepted within 5 days. [Transactions May 13.]

13 Write as Eustace & Co. May 12, to M. Constance & Son, advising them that a check has been given the Commercial National Bank for $629.31, covering their acceptance and protest expenses, and that the writer wishes to know why the paper was dishonored. [Transactions May 1 and 12.]

14 Write as Eustace & Co. May 13, to Jones Bros. Boston, making claim for shortage on invoice of May 9, 516 yd wool crepon. On arrival the case contained but 9 pieces and the figures on those received indicated that the missing piece contained 52 yd. [Transactions May 9.]

15 Write as M. Constance & Son to Eustace & Co. May 13, remitting a N. Y. draft for $350 on account and giving satisfactory reasons for failure to protect their acceptance. [Transactions May 1 and 12.]

## College Department

### 15TH BUSINESS EXAMINATION

## BUSINESS WRITING

**Friday, January 27, 1905 — 1.15 to 4.15 p. m., only**

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*Answer all questions. Credits for 1-5 and 6 depend on speed, legibility, accuracy and neatness; for the others on legibility, accuracy and neatness, without reference to speed. All answers must be written with pen and ink. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

**1-5 Write the selection given out as the first test [225 words to be written in 15 minutes; work then to be collected by the examiner].**

**6 Write the figures in the manner required by the second test [600 figures to be written in 10 minutes; work then to be collected by the examiner].**

**7-10 Write the following business papers and letters:**

### PROMISSORY NOTE

$1000.00 Rochester, Jan. 2, 1905

Six months after date, for value received, I promise to pay Charles Barton———————or order One thousand ——————————————Dollars

No. 1 Abner Wells

### NEW YORK DRAFT

**Commercial National Bank**

Rochester, Jan. 16, 1905 No. 896

Pay to the order of Harper & Wells —————$1030.75

Ten hundred, thirty———————————$\frac{75}{100}$ Dollars

To Produce Exchange Bank }
New York } E. A. Helmer, Cashier

### CONSIGNMENT LEDGER

Lot #1 A. L. BOSTWICK Chicago

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1905 | | Car 956 L. S. & M. S. 20,000 lb | | | | 1905 | | | | | |
| Jan. | 16 | 100 bbl. pork | | | | Jan. | 16 | Sold Parker & Johnson | | | |
| | | Freight N. Y C. 12¢ a 100 lb | V | $24 | 00 | | | 100 bbl. pork @ $10.90 | 2 | $1090 | 00 |
| | | Cartage 8c. a bbl. | V | 8 | 00 | | | | | | |
| | | Commission 2½% | 1 | 27 | 25 | | | | | | |
| | | N. Y. Dft. proceeds C. B. | 3 | 1030 | 75 | | | | | | |
| | | | | $1090 | 00 | | | | | $1090 | 00 |

### ACCOUNT SALES

Consignment ledger 1 Lot #1 Rochester, Jan. 16, 1905

Account sales by Harper & Wells of *100 bbl. ungraded pork, shipped in L. S. & M. S. car 956* for account and risk of *A. L. Bostwick, Chicago, Ill.*

| | | | | |
|---|---|---|---|---|
| *Jan. 16* | 100 *bbl. pork* @ $10.90 | | | $1090.00 |
| | *Charges* | | | |
| | *R. R. freight,* 20,000 ℔ | @ 12¢ a 100 ℔ | $24.00 | |
| | *Cartage* | " 8¢ " bbl. | 8.00 | |
| | *Commission* | 2½% | 27.25 | 59.25 |
| | *New York Draft for net proceeds* | | | $1030 75 |

*HARPER & WELLS*

*E. & O. E.* *C. T.*

### SIGHT DRAFT TO ACCOMPANY B/L

$2714.00 Chicago, Jan. 9, 1905 No. 561

At sight pay to the order of

The Continental Bank of Chicago, Illinois ——

Twenty-seven hundred, fourteen —— no/100 Dollars

Value received

To Flint & Steel

Rochester, N. Y. C E Partridge & Co.

### RAILWAY BILL OF LADING

## PINK LINE RAPID TRANSIT CO.

Bill of lading No. 6218 Chicago, *Jan.* 9, 1904

Received from *C. E. Partridge & Co* ———— the property described below in apparent good order (except as noted) marked, consigned and destined as indicated below, which the Pink Line Company for itself and its connections undertakes and agrees to carry to the said destination.

It is mutually agreed, in consideration of the rate of freight hereinafter named, as to each carrier of all or any of said property, over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall

**be subject to all the conditions, whether printed or written, herein contained, which conditions are hereby agreed to by the shipper, and by him accepted for himself and his assigns as just and reasonable.**

**On all the conditions, whether printed or written, herein contained, it is mutually agreed that the rate of freight from *Chicago* to *Rochester* shall be, in cents, per 100 ℔:**

| if 1st class | if 2d class | if 3d class | if 4th class | if special class 5 rate 7 |
|---|---|---|---|---|

**And advanced charges at................................$...............**

| Marks, consignee and destination | Description of articles | Weight, subject to correction |
|---|---|---|
| *Order Continental Bank, Chicago* | **2300** *bu. wheat* | **138,000** *lb.* |
| *Care Granite Nat'l Bank*<br>*Rochester, N. Y.* | *Cars* **1640, 76, 1215, 306, 920** | |

*Notify*
*Flint & Steel*

*T. E. HAVERLY*, **Agent**
*By L. Carpenter*

**Rochester, N. Y. Dec. 5, 1904**

Mr Abner Wells
Chicago, Ill.

My dear Abner: It is a long time since any communication has passed between us; but I can truly say that I have not lost any of the kind regard and sincere respect which I cherished for you when our meetings were of almost daily occurrence. I have been working hard in my business, and I think it unlikely that you have indulged to any great extent in the frivolities of life.

I write now because I have a proposition to submit to you, which I think may work to our mutual advantage. My business has been steadily growing as the years have slipped by, and I find now that I must have help in my work—help of a kind that I can not *hire*. I have no exact knowledge of your financial condition; but from what I knew of you in old times I am quite sure that you have not spent all your earnings. As to the present value of my business, I could undoubtedly get from $3000 to $4000 for the "goodwill" alone, if I would sell. Now if you want to take a partner's interest with me, there will be no question of goodwill. I have about $9000 in actual live assets, merchandise and cash, and if you wish to join me we will divide our gains or losses in proportion to capital, provided you don't go beyond my "pile." I should want you to take care of the financial end of the business. Please tell me how the proposition strikes you.

Sincerely your friend
Wilson Harper

---

Chicago, Dec. 8, 1904

My dear old friend:

Your letter filled my soul with joy, and I must say that I feel ashamed of my long silence toward such a friend. Your very kind proposition is singularly opportune. I had notified Mr Bostwick two or three weeks ago that I should not remain with him after the close of the year. He is a good man and very kind, but I am really pining for an older civilization. I haven't much wealth; a bookkeeper's berth, you know, is not calculated to build up a large fortune. I can, however, scrape up $2000 cash, and I am quite sure that Uncle Barton will indorse my note at six months for another $1000; and that, as I understand from your letter, will give me a quarter interest in your business. I think I can perform my part of the work to your satisfaction.

With the warmest feelings of gratitude for your very kind offer, I remain

Affectionately yours
Abner Wells

---

**These tests go to candidates at the beginning of the examination. They are speed tests, and the time must be exact.**

**ALL WRITING MUST BE DONE WITH PEN AND INK**

### First Test

*225 words to be written in 15 minutes; work then to be collected by the examiner.*

The national government has recently installed in the forts along the coast a new kind of telegraph, which is valuable for its accuracy and secrecy. It needs no operator, and preserves the message in autograph at both ends of the line.

The instrument is called a telautograph and looks very much like a wall telephone, but instead of mouthpiece and receiver it has an endless sheet of paper passing over rollers and across an open space on a projecting desk, where a pencil is held in place by two diagonal levers.

To use the instrument, the writer rings once, pulls out a lever at the side, grasps the pencil and writes the message on the paper, the rollers taking the sheet onward as it fills up. Metal slides hold the paper in place as the pencil travels over it. When the message is written, the writer rings twice and the thing is done.

When the bell rings, the receiving instrument sets to work in unison with the transmitting power, another endless sheet of paper, in an upright box instead of a desk, is moved by rollers, the same as in the transmitting instrument. As the writer's hand, many miles distant, moves the pencil across the paper, a self-feeding pen, similarly attached to diagonal levers, reproduces each motion, as if guided by an invisible hand.

### Second Test

*600 figures to be written in 10 minutes; work then to be collected by the examiner.*

Copy the following line of figures 20 times, preserving the regular spaces between the groups so that the work shall stand in perpendicular columns, as if for adding [All the groups must be on one page]:

*864 205931 79 63018 4 9165 420757382*

## College Department

### 17TH BUSINESS EXAMINATION

## BUSINESS WRITING

**Friday,** June 16, 1905—1.15 to 4.15 p. m., only

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*Answer all questions. Credits for 1-5 and 6 depend on speed, legibility, accuracy and neatness; for the others on legibility, accuracy and neatness, without reference to speed. All answers must be written with pen and ink. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1-5 Write the selection given out as the first test [225 words to be written in 15 minutes; work then to be collected by the examiner].

6 Write the figures in the manner required by the second test [600 figures to be written in 10 minutes; work then to be collected by the examiner].

7—10 Write the following business papers and letters:

[TIME DRAFT]

$627.50 Syracuse N. Y. May 1, 1905

Ten days after date

Pay to the order of Commercial National Bank——

Six hundred, twenty-seven————50/100 Dollars

Value received, and charge to account of

To M. Constance & Son }

Elmira N. Y. } Eustace & Co.

[BANK PASS BOOK]

**Dr. Commercial Nat'l Bank** In acc't with Eustace & Co. Cr.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1905<br>May | 1 | To Cash | 16952 | | 1905<br>May | 10 | | 303 | 80 |
| | 2 | | 184 | 30 | | | | 162 | |
| | 3 | | 98 | 65 | | 12 | | 750 | 78 |
| | 4 | | 235 | 75 | | | | 629 | 31 |
| | 5 | | 745 | 33 | | | | | |
| | 9 | | 72 | 75 | | 16 | 4 vouchers ret'd | 1845 | 89 |
| | 10 | | 226 | 25 | | | Balance | 17765 | 40 |
| | 11 | | 145 | 60 | | | | | |
| | 13 | | 535 | 26 | | | | | |
| | 15 | | 65 | 40 | | | | | |
| | 16 | | 350 | | | | | | |
| | | | 19611 | 29 | | | | 19611 | 29 |
| May | 17 | To Balance | 17765 | 40 | | | | | |

[ACCOUNT SALES]

Consignment ledger 1, lot 51 Little Falls, May 18, 1905

Account sales by H. S. Student of *5 cars, 2506$^{14}$ bu., corn* for account and risk of *Marsh & Co. Danville Ill.*

| | | | |
|---|---|---|---|
| *May* 18 | 2506$^{14}$ *bu. corn* @ 55¢ | | $1378.44 |
| | *Charges* | | |
| | *R. R. freight* 140,350 ℔ @ 10¢ ⅌ 100 | $140.35 | |
| | *Switching cars* | 3. | |
| | *Commission* 1¢ ⅌ *bu.* | 25.06 | 168.41 |
| | *Proceeds* | | $1210.03 |
| | *Less sight draft* | $877.19 | |
| | *Interest 20 days* | 2.88 | 880.07 |
| | *N. Y. draft to balance* | | $329.96 |

*E. & O. E.* *H. S. STUDENT*

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Larchmont N. Y. Apr. 19, 1905

George Eustace
Syracuse N. Y.

My dear Uncle George: After a profitable year abroad I have returned to my native state and am now ready for business. Nothing would please me better, if you will pardon my youthful presumption, than to take a half interest in your establishment. I can invest dollar for dollar in your business and I should be no drone in your hive. My ambition is to become an honorable and successful merchant, and I feel that in its attainment no teaching could be so valuable as yours. I have made earnest efforts to inform myself in the business, but it would be a great advantage to me to be associated with a man of your wide experience who would take a warm personal interest in my efforts.

With the added capital your business could be enlarged, if desired, and the results of my work would, I venture to believe, give you more time to devote to the larger interests of the business.

Hoping to hear from you, dear uncle, at your earliest convenience, I remain

Your affectionate nephew
John C. Traverse

---

Syracuse N. Y. Apr. 22, 1905

John C. Traverse
Larchmont N. Y.

My dear John: Your letter requesting me to take you into partnership is somewhat surprising. I wonder what you know about business. I have not the need of more capital, so what advantage would it be to me to give up half of my business to a man with no experience whatever and everything to learn? A young fellow who after four years in college spends another year traveling on the continent would be likely to get the idea that work was much like play, when in reality a business man must be hustling all the time in order to compete with rival concerns.

I admit that you write a good strong letter and that you seem to be very much in earnest—two strong points in your favor. I shall be glad to hear from you again and perhaps you may be able to convince me that I ought to think more seriously of your proposition.

Very cordially your uncle
George Eustace

**These tests go to candidates at the beginning of the examination. They are speed tests, and the time must be exact.**

**ALL WRITING MUST BE DONE WITH PEN AND INK**

### First Test

*225 words to be written in 15 minutes; work then to be collected by the examiner.*

While other countries, notably France and Germany, through their central banks, maintain a large proportion of their currency in the form of paper, they keep in circulation a greater proportion of metallic money than does the United States. The Treasury Department has recently reported $2,843,000,000 as the total stock of money in this country, $1,338,250,000 of which consists of gold coin and bullion. A large percentage of the gold and silver metallic stock of the country is represented by certificates. The amount of coin in active circulation, unrepresented by certificates, is only about $359,000,000; the remainder, or $2,500,000,000, circulates in the form of paper.

This paper circulation is, however, so amply protected by the metallic basis on which it rests and also through the provisions of law, that every dollar of the paper money passes current and is accepted without question as the equivalent of gold. In this respect our currency system is unique, and as long as confidence is maintained in the government's ability to exchange for gold all of its paper issues which may be presented, no holder of our currency will be likely to feel apprehensive regarding the absolute security of the country's money.

### Second Test

*600 figures to be written in 10 minutes; work then to be collected by the examiner.*

Copy the following line of figures 20 times, preserving the regular spaces between the groups so that the work shall stand in perpendicular columns, as if for adding [All the groups must be on **one page**]:

*3960 7 451836 207 351409176 89 85422*

## College Department

15TH BUSINESS EXAMINATION

# TYPEWRITING

**Thursday,** January 26, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer all questions. All answers except to questions 5-6 must be* **typewritten.** *Credits depend on neatness and accuracy. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1-2 Write on a typewriter the selection dictated as the first test [150 words to be dictated in three minutes, the work then to be collected by the examiner].

3-4 Copy on a typewriter the selection assigned as the second test [105 words to be copied in three minutes, the work then to be collected by the examiner].

5-6 Rewrite the following in longhand, making all necessary corrections and putting the statements into good English:

With the groath of whelth we fined incresing numbers of persons who want to envest their miens in good securatys. To do this succesively and saftly is a very dificult question. It is even more hard to keep money proftably employed than to make it. Changes and inovasions are of continnual concurrence. Not alone are new securatys constantly coming on the market, but new subdjects as a bases of their production are deciduously sought after. Every new-discoverd force or procces in mecanics mean the appearation of another detatchment of paper securatys. The war of the rebellion poplarized the cupoun bond consequently of its adopting by the goverment and made it the favourite form of infestment paper. Railroads and other corporasions soon aveiled themselves of the confidents which that specie of paper enspired. Do not rely soully on the advice of a broaker. By far the greater number of loses to envestors have been in securaty bought exclucively on the recomendation of commiscion men.

7 Mention *two* ways of making copies of outgoing business letters and describe fully the process that you prefer.

8 Give a detailed description of a suitable method for filing the correspondence (letters received and copies of answers) of a large mercantile firm.

9-10 Coleman & Co. Chicago, send Jones & Wagner, Syracuse, an invoice (date Jan. 6, 1904), covering 500 yd. Wilton @ $2.30, 400 yd. ingrain @ 60¢, 200 yd. Brussels @ 90¢, 2% off for cash. They make sight draft to cover invoice. Make out the invoice, draw draft and write a letter acknowledging receipt of invoice and stating that the draft is paid. [A carbon copy of your answer to 9-10 is required to accompany your answer paper.]

**These tests are not to be placed in the hands of the candidates till the work in dictation has been finished and collected by the examiner.**

### First Test

*150 words to be dictated in three minutes, the work then to be collected by the examiner.*

MINUTES

The principal substitute for the pen is the machine now
generally known as the typewriter, which in its present form
½ dates only from 1873. * Since that time it has come into
extensive use specially in America, where it was perfected
1 Many earlier attempts to produce such a machine * had
been made in both England and America, without practical
results.

The success of this machine induced many inventors to
½ enter the field, * and now there are three principal classes
of typewriters on the market, type-bar, cylinder and wheel
2 machines, the type-bar taking the lead. * All typewriters
bear a general resemblance to one another. Every machine
must print a letter when a key is struck and must also move
½ the paper * a little to the left with each stroke. With the
modern machine an expert operator is able to write at the
3 rate of 70 words a minute. *

### Second Test

*105 words to be copied in three minutes, the work then to be collected by the examiner.*

The greatest war maneuvers of American troops in time of peace took place last September on the historic battlefield of Bull Run. About 25,000 men, one fourth of them regulars, the remainder detachments of militia, representing some twenty states, were formed in two divisions, each with four brigades, with cavalry and artillery. They engaged in sham battles involving carefully directed strategic movements, and worked out each day a separate problem. These maneuvers were part of a general plan of bringing the regular troops and the state militia into closer relations, and of giving the officers practical experience in directing considerable bodies of men.

## College Department

### 16TH BUSINESS EXAMINATION

## TYPEWRITING

**Wednesday,** March 29, 1905—9.15 a. m. to 12.15 p. m., only

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*Answer all questions. All answers except to questions 5-6 must be* **typewritten.** *Credits depend on neatness and accuracy. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1-2 Write on a typewriter the selection dictated as the first test [150 words to be dictated in three minutes, the work then to be collected by the examiner].

3-4 Copy on a typewriter the selection assigned as the second test [105 words to be copied in three minutes, the work then to be collected by the examiner].

5-6 Rewrite the following in longhand, making all necessary corrections and putting the statements into good English:

So far as an exsess of exports over imports being any cryterion of advantagious Commerce, it is direckly the revers. Were not this the case merchants would loose on every transaction with foreigners and with them Trade would spedily be abandoned. It is almost impossable to compair the real value of the imports with those of exports. Of an exported comodity the value is estimated at the minute of its being sent abroad and before it's cost has been in creased by the expense of transportating across seas; whereas the value of the comodity imported in itstead after it having arived its destination and consiquently after its cost had been inhansed by the expense of freight Insurance importers proffets etc. In the 2nd place, even when a long list of balances are due it is not always evident from the fact that one country is sending gold to the other . . . It is next to impossable, then, to tell from the imports or from the fact that gold is being shipped abroad, whether the *balance of trade* is against or in favor of a particular country.

7 Describe in detail the process of manifolding by (*a*) the mimeograph or neostyle, (*b*) carbon paper.

8 Mention *five* important parts of a typewriting machine and state the use or purpose of each of these parts.

9-10 Your employer John Smith, Watervliet, N. Y., receives from Robert Johnson, wholesale provision dealer, Albany, a bill for 5 bbl. apples @ $1.75; 6 bbl. potatoes @ $2; 50 bu. corn @ 45¢; 125 bu. oats @ 28¢. This bill may be paid by (*a*) a check on Commercial Bank, Watervliet, or (*b*) a N. Y. draft (Commercial Bank, Henry Mason, cashier, on Exchange Bank, New York), or (*c*) a draft at 10 days on James Lansing in favor of Johnson. Write in proper form the four papers mentioned above. How would you obtain the N. Y. draft?

**These tests are not to be placed in the hands of the candidates till the work in dictation has been finished and collected by the examiner.**

### First Test

*150 words to be dictated in three minutes, the work then to be collected by the examiner.*

Minutes

Letters written with copying ink whether by hand or by
typewriter may be duplicated by a "roller copier." The
½ working of this machine, * which resembles a clothes
wringer, is quite simple. As you turn the crank strong
1 tissue paper is drawn from a roll through a tray of water *
and between the first and the second of three rubber
rollers, pressing out superfluous water. The letters are
½ fed, face downward and head foremost * between the
second and the third roller, by pushing them gently forward
one at a time along the tin bed of the machine till they
2 are grasped * by the lips of the rollers which carry the
moistened tissue. As the letters are copied they fall into a
½ wire basket, while the tissue strip * is wound on a reel
underneath the machine and left to dry. The copies are
3 then ready to be cut off and properly filed. *

### Second Test

*105 words to be copied in three minutes, the work then to be collected by the examiner.*

Up among the foothills of the Blue Ridge, a Virginia farmer cleared a new field for the pasture of his cows; but soon the animals sickened and one of them died. Suspecting that a spring which bubbled from the rocks in apparent purity, might be the cause, he had the water analyzed. It was found that it contained arsenic in such quantities as to render it dangerous to man and beast. This discovery led to a new industry, unique in the western hemisphere, the mining of arsenic ores and the manufacture of white arsenic, for which America has hitherto been entirely dependent on foreign markets.

## College Department

17TH BUSINESS EXAMINATION

# TYPEWRITING

**Thursday, June 15, 1905—9.15 a. m. to 12.15 p. m., only**

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*Answer all questions. All answers except to questions 5-6 must be* **typewritten.** *Credits depend on neatness and accuracy. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

**1-2 Write on a typewriter the selection dictated as the first test [150 words to be dictated in three minutes, the work then to be collected by the examiner].**

**3-4 Copy on a typewriter the selection assigned as the second test [105 words to be copied in three minutes, the work then to be collected by the examiner].**

**5-6 Rewrite the following in longhand, making all necessary corrections and putting the statements into good English:**

**Erly chemmists useto call everything a sugar which had a sweet taste, but the term in its sientific sence soon come to be restricted to the sweet principals in vegtable and animal juces. Only one of such, Cain Sugar, was knowed as a pure substans untill 1619, when a Nitalian chemmist issolated the** sugar of milk and proofed its individuallity. The origanal habatat of sugar cain is not knowable but it seems to been first in China cultivated. Sugar is not refered to by either Grecian and Roman writers until the rein of Nero.

All other sugars otherwise than cain sugar and sugar of milk was unknown till the year 1747' when a german chemmist Margraff first preduced sugar from white beat root. In 1779 a pupil sucsesser stablisht a beat sugar factry in Silesia. France soon made beat sugar abundent, and the industery caught a firm hold and from 1840 advanst with gyant steps.

7 Give in detail a clear description of a convenient system of filing the letters received and the copies of answers constituting the correspondence of an extensive business.

8 Explain the entire process of making 100 or more copies of a circular letter by means of the mimeograph or neostyle. Describe another method of duplication.

9-10 Your employers, Dickson Bros. Poughkeepsie, receive June 15, from Davis & Davis, wholesalers, New York, 12 pc. (562 yd) ticking @ 5½¢ a yd; 5 doz. men's kid gloves @ $7 a doz.; 10 pc. marquise lace @ $1.75 a pc. Make out invoice of the goods and draw a promissory note at 30 days in payment. Your firm, however, which does all banking business at National Commercial Bank (Howard Brown, cashier), decides to pay by N. Y. draft the amount due. Write the check to purchase such draft (at par) and the draft drawn on Bank of Manhattan. Write the necessary letter to Davis & Davis.

**These tests are not to be placed in the hands of the candidates till the work in dictation has been finished and collected by the examiner.**

### FIRST TEST

*150 words to be dictated in three minutes, the work then to be collected by the examiner.*

MINUTES

In writing telegrams do not use any salutation, compli-
mentary closing or other superfluous words. Make all mes-
½ sages as short as possible, but clear and definite. * A fixed
charge is made for all messages not exceeding 10 words,
and for every word in excess of that number there is an
1 additional charge * according to the distance.

No charge is made for the name and address of the per
½ son who is to receive the message, * or for the name of the
sender. Numbers should be written out in full since the
2 charge is the same for a single figure as for a word. * Each
part of a hyphenated compound word is counted as an en-
tire word, and each initial of a name is charged as a sepa-
½ rate word. *

Night messages are taken at reduced rates. These are
sent at any time after 6 o'clock but are not delivered till
3 the next morning. *

### SECOND TEST

*105 words to be copied in three minutes, the work then to be collected by the examiner.*

The cotton manufacturing industry is being much more rapidly developed in the South than in any other part of the country. Advantage is being taken of cheap labor, the absence of strikes the nearness of the manufacturing plant to the lands where the cotton is grown, the improved machinery and the facilities for exporting the goods. Northern capital is not backward in contributing to the establishment of new mills in desirable localities. When the Panama canal is completed, largely increased facilities will be open for export of the manufactured goods, and the South will doubtless be the great center of the world for this industry.

## College Department

72D LIBRARY EXAMINATION

# ELEMENTARY BIBLIOGRAPHY

**Thursday, December 22, 1904—9 a. m. to 12 m., only**

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***Answer 10 questions but no more. If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.***

**1–2 Trace the bibliographies covering books published in England from 1835 to the present date, and give briefly the scope of each.**

**3 Describe the *Bibliographie de la France* and compare it with similar weekly publications of the United States and Germany.**

**4 Compare, as to practical usefulness to the librarian, the following bibliographies: British Museum—Library, *List of Bibliographical Works in the Reading Room;* Whitney, *Catalogue of the Bibliographies of Special Subjects in the Boston Public Library;* John Crerar Library, *List of Bibliographies of Special Subjects.***

5 Name *four* important general bibliographies, giving the scope and relative value of each.

6–7 Indicate the scope and value of the following bibliographies: (*a*) Evans's *American Bibliography*, (*b*) *Monthly Cumulative Book Index*, (*c*) Kayser's *Vollständiges Bücher-Lexicon*, (*d*) *Catalogo generale della libreria italiana*, (*e*) *Bibliographie de Belgique*.

8 Where should you expect to find the bibliographic data of (*a*) a book published in Sweden between 1830 and 1865, (*b*) a book published in Denmark in 1898, (*c*) an old, rare Spanish book? Where should you look for (*a*) the publisher and price of a book published in Italy in 1900, (*b*) a good survey of Norwegian literature for the period of 1800–1868?

9 Give the meaning of the following bibliographic descriptions [Dictionaries may be used if desired]:

in -fol. goth. de 3 ff. prél. pour le prologue et la table, texte sign. a–z. et A.—Gv. à 2 col. de 39 lig. non compris le titre courant au haut des pages; avec fig. en bois.

3 tom. pet. in -8° (45 ff. non ch., 310, 296 et 231 ff. ch. un f. bl.) 1 l. 5 sh. Butler.

2 Tle. in 1 Bd. 2. [Titel=] Aufl. 8. (V, 170 u. III, 171 S.) Zürich [889.] 900. Th. Schröter. n. 2. —

gr. 4. (39 S. m. Abbildgn. u. 4 Lichtdr.—Taf.) Leipzig 900. Geb. in Halbldr. n. n. 1.90

Neu hrsg. u. umgearb. 3. Aufl. gr. 16. Freiburg (899). geb. in Leinw. n. 6. —

10 Give the meaning of the following bibliographic descriptions [Dictionaries may be used if desired]:

Milano, presso Giovanni Meiners e figlio libraio, 1839. - In - 8, di pag. VI—312 e 2 tavole. L. 2.60

Venezia, presso Giuseppe Antonelli, 1839.—Fasc. XLIV e XLV (tomo IV, fasc. 8 e 9). In -4 a 2 colonne. Ogni fasc. di pag. 16 e 2 tavole intagliate. — L. 87

2e druk. Leiden, Blankenberg & Co. (Amst., C. A. J. van Dishoeck). 1896. gr. 8o. m. 1 plt. f 1.50; geb. f 1.90.

Amst., F. H. J. Bekker. 1899, 1900. Deel I–IV. gr. 8o. Compleet in 8 deelen, bij inteek. à f 0.60; geb. f 0.90; afz. dln. f 0.70; geb. f 1.—.

11–15 Five questions will be assigned to test skill in using bibliographies.

NOTE—Use reference books. Hand in with answers a list of all reference books used, in the order used. If you wish to consult a book not in the room, ask the examiner for it.

## College Department

73D LIBRARY EXAMINATION

# ADVANCED BIBLIOGRAPHY

**Wednesday, March 29, 1905—9 a. m. to 12 m., only**

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*Answer 10 questions but no more. If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

**1 Describe and criticise the latest edition of the *A. L. A. Catalog*.**

**2 What books should you consult in making up a reading list on dramatic literature?**

**3 What bibliographic works should you consult in ordering $50 worth of books on education?**

**4 Characterize briefly *five* books that would be of great value as bibliographic material on useful arts.**

**5 Describe and criticize Larned's *Literature of American History*.**

**6 Mention the works that should be consulted in making the** first selection and purchase of fiction for a public library of 5000 volumes.

7 Describe fully *one* work useful as a subject bibliography of the fine arts.

8 Mention *one* bibliography on *each* of the following subjects: (*a*) theology, (*b*) sociology, (*c*) law, (*d*) philology, (*e*) scientific periodicals, (*f*) geology, (*g*) zoology, (*h*) German literature, (*i*) the Middle Ages, (*j*) genealogy.

9 Mention and compare *two* bibliographies of philosophy.

10–12 Select *five* books on monopolies and trusts that would be of great value in a college library.

13–15 Select 10 books on Japan that would be of great value in a public library, *e. g.* the Springfield City Library.

## College Department

73D LIBRARY EXAMINATION

# ACCESSION DEPARTMENT WORK

**Wednesday,** March 29, 1905 — 2 to 5 p. m., only

*Answer questions 1–2, 3–4 or 5–6 and six of the others but* **no more.** *If more than six of the others are answered only the first six answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Enter *six* volumes (to be assigned) on condensed accession sheets, using *Library School Rules.*

For questions 3–7 write on the back of order slips the titles of reference books used.

3–4 Make out order slips for the following *four* books:
Jusserand, Les Anglais au moyen âge.
Morris, Present Irish Questions.
Gottschall, Studien zur neuen deutschen Litteratur.
Horne & Scobey, Stories of Great Artists.

5–6 Make out order slips for the following *four* books:
Rostand, Les Romanesques.
Fleming, Our Gracious Queen, Alexandra.
Hartmann, Die Weltanschauung d. modernen Physik.
Price & Gilbert, Heroes of Myth.

7 Make out order slips for the following *two* books:
Biagi, Aneddoti letterarî.
Kipling, Soldiers Three. [Make out order slip for a Dutch edition.]

8 Give the arguments for and against the use of the accession book.

9–10 Mention (*a*) several methods of doing away with the accession book, (*b*) several libraries that do not use an accession book. Describe with some detail *one* of the methods mentioned.

11 Which of the following items do you consider essential in the accession book of a small library: author, title, accession number, class number, book number, source, paging, publisher, cost, binding, volume number?

12 Would you consider it advisable to collate new books for imperfections in (*a*) a public library, (*b*) a large reference library? Give reasons.

13 What records of gifts to a library is it desirable to make? Would you use a gift bookplate? Would you acknowledge gifts? Give reasons in each case.

14 What points should be considered in designing a bookplate for a public library? State reasons for and against the use of a bookplate in a small library.

15 Describe the system of distribution of public documents to libraries by the United States government.

## College Department

73D LIBRARY EXAMINATION

# SHELF DEPARTMENT WORK

**Friday,** March 31, 1905 — 2 to 5 p. m., only

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*Library School Shelf List Rules,* Cutter's *Author Tables, Special Author Schemes* and *Time Number Scheme* may be used in the examination.

*Answer questions 1-5 and five of the others but* **no more.** *If more than five of the others are answered only the first five answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1-2 Assign 20 book numbers according to the instruction of the New York State Library School, class numbers, authors and titles being given.

3-5 Make 20 shelf list entries (the necessary facts being assigned), using cards.

6 Give *three* practical reasons for keeping a shelf list.

7 State the advantages and disadvantages of a shelf list on (*a*) sheets, (*b*) cards.

8 Describe the Biscoe time numbers. In what classes of books are they most useful?

9 Mention the different methods of marking call numbers on the backs of books. State the advantages and disadvantages of each method mentioned.

10-11 What differences do you advocate in the acquisition and treatment of pamphlets in a large historical library and in a popular town library?

12 Discuss the question of the circulation of music by public libraries. Mention several important libraries that circulate music or that have valuable reference libraries of music.

13 Is an inventory necessary? How should it be taken? How often?

14-15 Outline briefly the attitude of the American Publishers' Association toward libraries since 1901. State reasons for (*a*) the publishers' attitude, (*b*) the librarians' attitude.

## College Department

73D LIBRARY EXAMINATION

# ELEMENTARY CATALOGUING, part 1

Thursday, March 30, 1905 — 2 to 5 p. m., only

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*Answer 10 questions but* no more. *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

The following helps may be used: *Peabody Catalogue*, Webster's *Dictionary*, Lippincott's *Gazetteer*, *A. L. A. Subject Headings*, *A. L. A. Catalog*.

Give all the dictionary catalogue entries necessary for *five* of the following books, specifying the author entry and mentioning also the *See* and *See also* references suggested by the subjects. Do not select two books under the same number.

1 Stevenson, Familiar Studies of Men and Books.

2 Bliss, Side Glimpses from the Colonial Meeting-house.

3 Ladd, The War with Mexico.

4 Griffin, List of Books Relating to Trusts.

5 (*a*) Bacon, Literary Pilgrimages in New England; *or*, (*b*) Betts, The Leaven in a Great City; *or*, (*c*) Bolton, Private Soldier under Washington.

6 (*a*) Brooks, Dames and Daughters of Colonial Days; *or*, (*b*) Foster, American Diplomacy in the Orient; *or*, (*c*) Sichel, Women and Men of the French Renaissance.

7 Gordy and Twitchell, Pathfinder in American History.

Answer *two* of the following three questions:

8 Define (*a*) the dictionary catalogue, (*b*) the classed catalogue. State the chief advantage of (*a*) the dictionary catalogue over the classed catalogue, (*b*) the classed catalogue over the dictionary catalogue.

9 In cataloguing a popular library of 10,000 volumes (*a*) how full an imprint would you use, (*b*) how much analytic work would you do, (*c*) would you, both names of an author being known, enter under the real name or under the pseudonym, (*d*) when would you make title cards, (*e*) when would you make series cards?

10 Mention (*a*) some of the principles that should guide you in the assignment of subject headings for the catalogue of a small library, (*b*) some of the helps that you should use.

Answer *three* of the following five questions in accordance with the *Library School Card Catalogue Rules:*

11 What should be the main author entry for (*a*) a library catalogue, (*b*) a Bible, (*c*) a directory, (*d*) a government report, (*e*) a pseudonymous book, author found?

12 Why should secondary cards be traced on the main card or cards? What do you consider to be the best method of tracing cards? Why?

13 How is a life of Christ catalogued in the New York State Library?

14 What cards are made for a biography in (*a*) a dictionary catalogue, (*b*) the New York State Library catalogue?

15 Using either specific cases (real or imaginary) or general formulas, indicate the form of *each* of the following cards: (*a*) editor card, (*b*) pseud. of card, (*c*) author analytic see card by a different author from the author of the book, (*d*) subject card for a criticism of a special book.

## College Department

### 74TH LIBRARY EXAMINATION

# ELEMENTARY CATALOGUING, part 2

### Tuesday, June 20, 1905 — 2 to 5 p. m., only

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*Answer questions 1-3 and seven of the others but* no more. *If more than seven of the others are answered only the first seven answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

*Library School Rules, Decimal Classification,* special book number schemes and students' cataloguing notes may be used in the examination. Model catalogues may not be used.

1-2 Catalogue, as for the New York State Library, Taylor, The Study of the Child. Give call number. Give full names and dates. Reference books but not name list may be used.

**For questions 3-15 indicate all entries instead of cataloguing in full; e. g.**

**Main author card under Smith, Samuel**
**" subject " 875.1**
**Added entry editor card under Brown, Oliver**
**Analytic author " Duffield, Francis**

**Indicate use of red ink headings, red numbers and colored cards.**

**Use of reference books is allowed but full names and dates are not required. Name list slips and tracing need not be indicated.**

3 Essays on Lord Tennyson's Idylls of the King.

4-5 Guide to the Study of Nineteenth Century Authors.

6 History of the United States Navy.

7 Reveries of a Bachelor.

8 (*a*) The Dynamo; *or*, (*b*) Electrical Engineering.

9 (*a*) List of References on the Popular Election of Senators; *or*, (*b*) Select List of References on the Negro Question.

10 Studies in Shakespeare.

11 Nathan the Wise.

12 (*a*) William Gilmore Simms; *or*, (*b*) William Cullen Bryant.

13 (*a*) Life of Goethe; *or*, (*b*) Life of Dante; *or*, (*c*) Shakespear.

14 (*a*) Life of Christ; *or*, (*b*) Life and Teachings of Jesus.

15 (*a*) Adventures of Harry Richmond; *or*, (*b*) The Ordeal of Richard Feverel.

## College Department

### 73D LIBRARY EXAMINATION

# ADVANCED CATALOGUING

### Thursday, March 30, 1905—9 a. m. to 12 m., only

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*Library School Card Catalogue Rules* and German, French and Latin lexicons may be used in the examination.

*Answer questions 1-3 and seven of the others but* no more. *If more than seven of the others are answered only the first seven answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

**1-3 Draw up your plan for cataloguing *one* book under *each* of the following groups, indicating in each case the number of cards required:**

**a Book A [Three pieces]; *or*, Book B [Three pieces]; *or*, Book C [Three pieces]. [Assume that the library has no more of these sets.]**

**b Book X [One piece]; *or*, Book Y [One piece]; *or*, Book Z [One piece].**

**4 Revise and rewrite, with special reference to penmanship, *one* card (to be assigned).**

5 Translate into English, using dictionaries if desired, titles (to be assigned).

6 Compare briefly the cataloguing codes of Wheatley and Perkins.

7-8 Outline the growth of the cataloguing rules of (*a*) the American Library Association, (*b*) the Library Association of the United Kingdom. What is the present status of these two codes?

9-10 Outline the development of the *British Museum Catalogue.*

11 Compare very briefly the cataloguing work of France and Italy.

12-13 Imagining yourself librarian of some public library, write a letter to the board of trustees of the library, outlining (*a*) the advantages to be gained in the use of the catalogue cards prepared by the Library of Congress, (*b*) the best method of ordering cards.

14-15 How long will it take an expert cataloguer, with two trained assistants, to reclassify and catalogue a public library of 15,800 volumes, if the expert works eight hours a day and the assistants four hours each? How much will this work cost?

## College Department

74TH LIBRARY EXAMINATION

# DICTIONARY CATALOGUING

**Friday, June 16, 1905 — 9 a. m. to 12 m., only**

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***Answer 10 questions but* no more. *If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.***

The following helps may be used: for questions 1-2, *A. L. A. Catalog;* for questions 7-15, *A. L. A. Catalog*, *A. L. A. Subject Headings*, Cutter's *Rules for a Dictionary Catalog*, *Library of Congress Subject Headings*, Lippincott's *Gazetteer*, *Peabody Catalogue*, Webster's *Dictionary* and students' cataloguing notes. Students' model catalogues may not be used.

1-2 Give your opinion of the dictionary part of the new *A. L. A. Catalog* as a help to cataloguers, indicating its strong and its weak points.

3 What entry and references would you make for (*a*) a collection of English lyric poetry, (*b*) a bibliography of French drama, (*c*) an argument for woman's suffrage?

4 How would you arrange author and subject entries under Bible and its subdivisions? Give reasons.

5 Annotate the Library of Congress subheads under U. S. *History. Civil War* (to be assigned) so as to show which subheads you would consider useful in a public library of 20,000 volumes.

6 Give *two* methods of cataloguing family and place genealogies. State which method you prefer. Give reasons.

Give all the entries necessary for the following books, specifying the author entry and mentioning also the *See* and *See also* references suggested by the subjects. Do not select two books under the same number.

7 Report of the effect of the International Copyright Law in the United States.

8 A. L. A. Catalog.

9 (*a*) Woman's Share in Primitive Culture; *or*, (*b*) Women of the Renaissance.

10 (*a*) The Viking Age; *or*, (*b*) The Puritan as a Colonist and a Reformer.

11 (*a*) Catalogue of Cambridge Books; *or*, (*b*) British Topography.

12 (*a*) The Psychology of Peoples, Its Influence on Their Evolution; *or*, (*b*) American History and Its Geographic Conditions.

13 (*a*) Education of the Central Nervous System; *or*, (*b*) Student Life and Customs.

14 Evolution of the Japanese.

15 Greater Russia; *or*, Russia against India.

## College Department

72D LIBRARY EXAMINATION

# ELEMENTARY CLASSIFICATION

**Wednesday, December 21, 1904—9 a. m. to 12 m., only**

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The following books may be used as helps: Dewey's *Decimal Classification*, Webster's *Dictionary*, Lippincott's *Gazetteer*, Lippincott's *Biographical Dictionary*.

*Answer questions 12–15 and six of the others but* no more. *If more than six of the others are answered only the first six answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

**Give class numbers for the following subjects, carrying them down as far as possible; also explain the significance of the class numbers, e. g.:**

**914.21=travel in London**
**9=history**
**1=travel**
**4=Europe**
**2=England**
**1=London**

1 Architecture of the Renaissance in Paris. Reports of the town officers of Salem Mass.

2 Religious history of Virginia. History of the federal government of Switzerland.

3 History of Dutch reformed missions. Financial history of California.

4 Dictionary of the Gothic language. Map of Vienna.

5 History of slavery in Cuba. History of the libraries of New South Wales.

6 Life of Frederika Bremer. History of old Trinity Church, New York city.

7 Paleontology of New Jersey. Antiquities of Athens.

8 Geology of the Adirondacks. Bibliography of the official publications of the Continental Congress.

9 History of publishing in the Netherlands. Syriac-Latin dictionary.

10 Holy Bible translated into the Burmese from the original tongues. College songs of Yale college.

11 Catalogue of the flora about Niagara Falls. Review and criticism of modern Russian novels.

Assign class numbers and references (if necessary) to the following books:

12 Pestalozzi's Leonard and Gertrude.
13 Sayce, Fresh Light from the Ancient Monuments.
14 Shaler, Sea and Land.
15 Elting, Dutch Village Communities on the Hudson River.

## College Department

74TH LIBRARY EXAMINATION

# ADVANCED CLASSIFICATION

## Wednesday, June 21, 1905 — 9 a. m. to 12 m., only

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*Answer 10 questions but* no more. *If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

For questions 3-4 the *Belgian Classification Scheme* may be used; for questions 3-15 the following books may be used: Dewey's *Decimal Classification*, Cutter's *Expansive Classification*, Webster's *Dictionary*, Lippincott's *Gazetteer*, Lippincott's *Biographical Dictionary*.

1-2 Compare the classification of languages in the *Expansive Classification* with that in the *Decimal Classification*.

**Classify the following subjects according to the general principles of the Belgian modifications of the *Decimal Classification* as proposed by the Institut International de Bibliographie:**

**3 Martin Waldseemüller and the early Lusitano-Germanic cartography of the New World. Development of pumping machinery for dry docks. Disfranchisement of negroes in Maryland.**

4 Prussian cooperation at the battle of Waterloo. Aboriginal pottery of the eastern United States. Blanket weaving industry among the Navajo.

Classify the following books by both the *Decimal Classification* and the *Expansive Classification:*

5 Eggleston and Seelye, Pocahontas.

6 Kingsley, The Roman and the Teuton.

7 McCurdy, History, Prophecy and the Monuments.

8 Peet, The Ashtabula Disaster; *or*, Behring, Suppression of Tuberculosis; *or*, Smyth, Physical Deterioration.

9 Sumner, The Financier and the Finances of the American Revolution; *or*, Hatch, The Administration of the American Revolutionary Army.

10 Bagehot, Lombard Street.

11 Weeden, Social Law of Labor.

12 Houssay, Industries of Animals.

13 Osler, Science and Immortality; *or*, Passmore, Things Beyond the Tomb; *or*, Luckock, After Death.

14 Egleston, The Home and Its Surroundings.

15 Lampredi, Du Commerce des neutres; *or*, Arendt, Essai sur la neutralité de la Belgique; *or*, Rhamm, Die Verfassungsgesetze des Herzogthums Beaunschweig; *or*, His, Das Strafrecht der Friesen im Mittelalter.

### College Department

74TH LIBRARY EXAMINATION

## INDEXING

**Thursday,** June 22, 1905 — 2 to 5 p. m., only

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*Papers entitled to 75 or more credits will be accepted.*

Index the *Outlook*, Jan. 14, 1905, p. 95–148, making the entries you think desirable for the index to the bound volume. Do not mark the book. Write *each* entry in proper form on v. slip, giving page reference. Do not arrange slips alphabetically, but hand in in order of entry.

## College Department

74TH LIBRARY EXAMINATION

# FOUNDING AND GOVERNMENT

**Saturday, June 17, 1905—9 a. m. to 12 m., only**

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*Answer 10 questions but* no more. *If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

**1–2 What has been the trend of library legislation for the past five years?**

**3–4 Give an account of state library commissions and their methods of work.**

**5 What is the work of a state library organizer? What is the value of that work to the small library?**

**6 Give reasons for keeping and reporting library statistics.**

**7 What items should be included in annual library reports to the state?**

**8 Give objections to the support of a public library by** public taxation. Indicate the proper answer, if any, to each objection.

9 Under what conditions is it desirable to secure library privileges under a contract with an existing library rather than to establish a new library?

10 What standing committees should be appointed by the board of library trustees? Indicate the functions of each committee.

11–12 Why should a borrower from a public library be limited to one book at a time? Give any reasons for modifying this rule, mention the conditions under which more than one book may be allowed and state how far such increase of privilege may be safely and profitably carried.

13 By whom should library assistants be appointed? Give reasons.

14 Give advantages and disadvantages of selecting library assistants by civil service examination.

15 Suggest some changes by which the public library situation in the city of Albany might be improved.

## College Department

### 73D LIBRARY EXAMINATION

## LIBRARY BUILDINGS

Friday, March 31, 1905—9 a. m. to 12 m., only

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*Answer questions 1–2, 3–6 and four of the others but* **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Criticize a set of plans (to be assigned):

3–6 On the second story of an office building two large rooms, each 20x30 feet, are to be used for a library. There is a hallway 10 feet wide between them, which may also be used. Partitions can be cut away or added. There are 2 front windows in each room, 3 side windows in the south room and one window at the end of the hall. Windows occupy 5 feet of wall space apiece, are set 2½ feet from corners and there are 5 feet between them. Doors are 4 feet wide and are set 4 feet from west partitions. In the west wall of the north room is a closed door 8 feet from the corner. Place shelves and furniture for a public library, using plan as drawn on question paper if more convenient. If room for all departments under one librarian is allowed, how large a library can be accommodated? Give figures of calculation. [Disregard thickness of partitions. Plan for a single story of cases only.]

7 For a library of 15,000 volumes that adds 800 volumes a year and has a reading room holding 5000 books, how much book capacity should be provided on main floor of book room? Give figures used in calculation.

8 Give dimensions of a reading room needed for an average of 25 readers at one time. Give figures used in calculation.

9 In what respects should public access to shelves modify the plan of a library building?

10 Describe *three* different types of college library buildings, stating advantages of each.

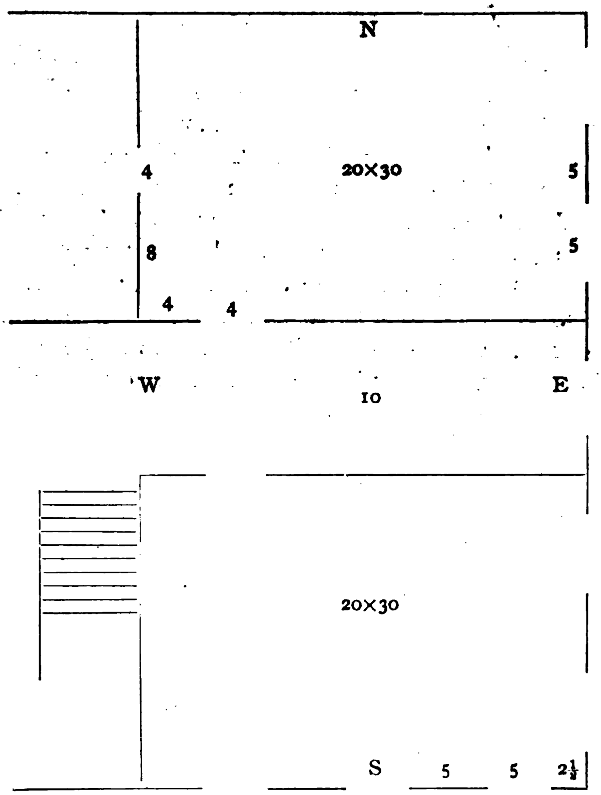
11 A state university asking from the Legislature $200,000 for its library building wishes to obtain floor plans, elevations and estimates to illustrate and further its object. Advise the university as to the course to be pursued, naming any library (college or public) from which valuable suggestions can be obtained.

12 What special difficulties are likely to arise in planning a library building to be situated on a corner lot?

13 Describe *five* different kinds of shelf pins or other devices for supporting shelves, stating advantages of each.

14 What are the disadvantages of placing an assembly room in a library building?

15 State *five* purposes to be served by a library building.



Scale ⅕ cm. to one foot

## College Department

74TH LIBRARY EXAMINATION

# LOAN DEPARTMENT WORK AND BOOK-BINDING

**Wednesday,** June 21, 1905 — 2 to 5 p. m., only

*Answer questions 11–12, 13, two others on binding and five on loan department work but* no more. *If more than seven of the others are answered only the first seven answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

### LOAN DEPARTMENT WORK

1 Explain what is meant by (*a*) book record, (*b*) reader's record, (*c*) time record, (*d*) double entry, (*e*) single entry.

2 Describe various methods of keeping (*a*) the book record, (*b*) the reader's record, (*c*) the time record.

3 Discuss the importance of intelligent service in the loan department. Give the requisite qualifications for (*a*) assistants, (*b*) the head of the department.

4–5 Compare in tabular form the processes of the Newark and Browne loan systems.

6 Describe the New York State Library loan system.

7 Give the main features of the Columbia University Library loan system.

8 Discuss the relation of the loan department of a public library to the city board of health.

### BOOK-BINDING

9–10 Describe in outline the process of binding a book. [Minute detail is not desired.]

11–12 Describe fully the bindings of 10 books (to be assigned), indicating materials of both sides and back, and any peculiarities of binding.

13 Fill out binding slips for *five* books (to be assigned).

14 What are some of the considerations that should determine the selection of binding materials for different classes or kinds of books?

15 Explain the meaning of the following terms as used by binders: (*a*) sewing all along, (*b*) sewing two on, (*c*) headband, (*d*) signature, (*e*) end papers.

## College Department

74TH LIBRARY EXAMINATION

# HISTORY OF LIBRARIES AND PRINTING

### Tuesday, June 20, 1905—9 a. m. to 12 m., only

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*Answer 10 questions but* no more. *If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

**1 Give a brief general description of medieval libraries.**

**2 What is meant by the invention of printing? What are the claims for Mainz as the place of this invention and for Gutenberg as the inventor?**

**3 Outline the development of illumination from the simplest form to the most elaborate. Characterize briefly the styles in (*a*) France, (*b*) Germany, (*c*) Italy.**

**4 Describe the various types of French libraries. How do they compare with one another and with similar libraries of other countries in (*a*) size, (*b*) value for scholarly research, (*c*) value for popular use?**

5 If you were making an extended foreign tour what *five* libraries would you like to visit? Give reasons in each case.

6 Outline important events in library history since 1841, giving the most important dates.

7–8 Compare present library conditions in England and the United States.

9 Describe the library facilities of some one large city in the United States.

10 Give a criticism of Columbia University Library.

11 Describe the growth and development of branch library systems.

12 Name 20 American libraries of different types that stand in the front rank as regards good methods, good administration and valuable work accomplished.

13 Characterize *each* library mentioned in question 12 by giving the line of its special attainment.

14 Mention valuable collections on special subjects in American libraries. What is the best source of information on special collections?

15 Name and characterize the most important sources of information on the history of libraries.

## College Department

### 74TH LIBRARY EXAMINATION

# ELEMENTARY REFERENCE

### Friday, June 16, 1905 — 2 to 5 p. m., only

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*Answer 10 questions but* no more. *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Name 10 reference books indispensable for a high school library in a town where there is no other library available. Give reasons for the choice of each book.

2 Comment briefly on *each* of the following dictionaries and compare carefully any *two* of them: Webster's, Stormonth's, Century, Standard, Murray's.

3 Name *three* slang dictionaries. Discuss the value of this class of books in reference work.

4 Describe the *New International Encyclopaedia.* Discuss its value as a work of reference.

5 What need does a year book or annual fill in a library? Name *five* annual publications of general statistic information.

6 Mention some of the more important sources from which you might hope to gain information of allusions, phrases and similar literary matters.

7 Compare Bartlett's *Familiar Quotations* with Hoyt & Ward's *Cyclopaedia of Practical Quotations*, bringing out the peculiar excellencies of each work.

8 Name *one* good cyclopedia of *each* of the following subjects: mechanics, architecture, music, painting, horticulture, medicine, political economy, biblical literature, statistics.

9 Describe the works that are keys to the contents of general periodical literature in our language.

10 What kind of information about Ephesus would you expect to find in (*a*) Lippincott, (*b*) Haydn, (*c*) McClintock & Strong, (*d*) Smith's *Dictionary of Christian Antiquities*, (*e*) Smith's *Dictionary of Greek and Roman Geography?*

11 Name *two* good historical handbooks. Give the scope of each.

12 What reference books on English and American literature should be put into a public library of 10,000 volumes?

13 State where you would expect to find information on the following questions: (*a*) What is the origin of the term "carpet bagger" and how is this term used? (*b*) Where are hot cross buns most extensively eaten? (*c*) Did John Hay write anything during 1903 on international questions? (*d*) Where can an account of the Battle of Breed's Hill be found? (*e*) Where can information about the national costume of Scotland be found?

14 Name the prominent reference libraries in this country.

15 Name *five* first class periodicals on *each* of the following subjects: (*a*) religion, (*b*) economics, (*c*) literature, (*d*) science.

## College Department

### 74TH LIBRARY EXAMINATION

# ADVANCED REFERENCE AND SELECTION OF BOOKS

**Thursday, June 22, 1905—9 a. m. to 12 m., only**

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*Answer three questions on advanced reference and seven questions on selection of books but* no more. *If more than 10 questions are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

### ADVANCED REFERENCE

**1 What are the points essential to excellence in a work of reference?**

**2 Mention some of the aids to reference work other than books themselves that the reference librarian will find useful.**

**3 What disposition should the small library containing less than 25,000 volumes make of the United States documents? Under what conditions would you advise a library to keep its set of government documents intact? When is it advisable to** distribute department reports under their class numbers?

4 Describe *three* kinds of publications of historical societies.

5 To what extent should a public library having less than 25,000 volumes and an annual book allowance of $1500, purchase law books? Name any *three* law books that you regard as desirable in a public library.

### SELECTION OF BOOKS

6 Discuss somewhat fully the subject of book annotation.

7 Criticize and estimate Waddington's *Letters of a Diplomat's Wife; or*, Willard's *Tramping with Tramps; or*, Sherwood's *Daphne; or*, Bruncken's *North American Forests and Forestry.*

8 Compare the works on China by Martin, Landor and Smith.

9 Name lives of Washington *or* of Lincoln that you would recommend for (*a*) a college library, (*b*) a large public library, (*c*) a children's room, (*d*) a village library.

10 Compare Fraser's *Letters from Japan* with Clement's *Handbook of Japan; or*, Page's *Rebuilding of Old Commonwealths* with Murphy's *Problems of the Present South; or*, Morrison's *Tales of Mean Streets* with Whiting's *No. 5 John st.*

11 Mention the classes of readers to whom you would recommend the following books: (*a*) Embassy to Provence, (*b*) Amateur Cracksman, (*c*) Heart of the Ancient Wood, (*d*) Chimmie Fadden and Mr Paul, (*e*) Mohawk Valley, (*f*) Hurll's Rembrandt, (*g*) Jesus Christ and the Social Question, (*h*) The Gentle Reader, (*i*) Life of the Bee, (*j*) Field Book of Wild Birds and Their Music.

12 What helpful ideas on the selection of books in religion did you get from the Selection of Books course?

13 Give fully your opinion as to the class and the proportion of fiction that should be bought for public libraries. Give reasons.

14 Of what value are book reviews as aids to the librarian in deciding with reference to certain books (*a*) whether they are desirable for his library, (*b*) to what classes of readers they should be recommended?

15 Estimate from the standpoint of the librarian the work of any *five* of the following publishers: Charles Scribner's Sons, The Macmillan Company, Houghton, Mifflin & Co., D. Appleton & Co., G. P. Putnam's Sons, Fleming H. Revell Co., G. W. Dillingham Co.

## College Department

80TH EXTENSION EXAMINATION

# AN ETHICAL AND EDUCATIONAL STUDY OF AUTOBIOGRAPHY

Saturday, June 10, 1905—Three hours only

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*Answer questions 2, 4, 7, 8, 11 and three of the others but no more. If more than three of the others are answered only the first three answers will be considered. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

1 Classify as to type the six autobiographies of your course. Why should teachers study such a course?

2 Discuss Loti's life with reference to the problem of religion. Explain the relation of his subsequent life to his childhood and give a general estimate of the worth of his life.

3 Criticize Mill's early education and state what suggestions there are in it for modern education in childhood, youth and adolescence.

4 Outline the evolution of Tolstoi's religious and social ideals.

5 Compare and contrast the mental and religious crises of Mill with those of Tolstoi. What are the practical lessons of Tolstoi's life for teachers?

6 Compare the value of the *Journal* with that of the other published works of Amiel. State on which of the four great problems Amiel's life centers and explain your answer.

7 What saved Amiel from pessimism? In what does the charm of Amiel lie? in what, his power?

8 What are the main lessons for education from the story of Kovalevsky's childhood? What light does her experience throw on the woman problem?

9 Contrast Kovalevsky's subjectivity with that of Amiel.

10 Show in regard to each of the following how the time in which he lived, his nationality and social conditions influenced him: Goethe, Mill, Tolstoi.

11 Compare Goethe, Mill and Tolstoi as to breadth of interest. What does Goethe stand for to the later ages?

12 Grade in the order of their worth to the world the six lives studied, giving reasons for your estimates.

## College Department

### 80TH EXTENSION EXAMINATION

# DESCRIPTIVE AND EXPLANATORY PSYCHOLOGY

**Saturday,** June 10, 1905 — Three hours only

---

*Answer questions 6, 7, 8, 10, 12 and three of the others but* no more. *If more than three of the others are answered only the first three answers will be considered. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

1 What is psychology? State the difficulty in determining the subject matter and the definition of psychology.

2 Is a definition of consciousness possible? Give reasons for your answer.

3 Give the fundamental physical, mental and moral differences between a child and an adult.

4 Is a knowledge of the psychology of the adult mind adequate for a teacher's needs? Give reasons for your answer.

5 What has the body to do with (*a*) the mind, (*b*) sensations, (*c*) emotions?

6 Define attention. Illustrate concretely the growth of voluntary attention from involuntary. Discuss in full the pedagogic applications.

7 State the law of mental development. Indicate a few differences as to fundamental capacity between individuals, giving the causes of these differences. How can education meet this fact?

8 Show by the use of concrete examples how sensations, percepts and concepts differ. Why should a teacher understand the psychology of (*a*) perception, (*b*) conception, (*c*) imagination?

9 Show how judgment is related to conception. Discuss in full the training of (*a*) the judgment, (*b*) the reasoning powers.

10 What is the relation between knowing and doing? Discuss the development and training of the will.

11 Are the ordinary educational ideals of cultivating the emotions adequate? Explain your answer.

12 Explain in full the practical value to you as a teacher of your knowledge of psychology.

## College Department

80TH EXTENSION EXAMINATION

# WATER COLOR PAINTING

### Saturday, June 10, 1905—Three hours only

---

*Answer eight questions but* no more. *If more than eight are answered only the first eight answers will be considered. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

1 Make a finished color sketch of a flower with leaves, and analyze to prove that the drawing shows (*a*) unity, (*b*) balance, (*c*) rhythm, (*d*) strength.

2 Describe the method of presentation in teaching the brush work drawing and coloring of an autumn leaf.

3 State three principles of grouping and draw a group of two or more objects in three tones to illustrate these principles.

4 Describe the brush movements to be used in drawing a hollow cylindric object with its shadows. Illustrate these movements by drawing an empty stone jar as seen in bright sunlight.

5 What is the effect of distance on color? Describe the method of gaining a balance of color in painting a landscape of summer woodland and green fields.

6 How may white objects, high lights, breaks in masses of foliage, spaces between objects, seafoam etc. be represented in brush work? Show the required touch and treatment by illustrating in color the following:

> The breaking waves dashed high
> On a stern and rock-bound coast,
> And the woods, against the stormy sky,
> Their giant branches tossed.

7 Make a drawing of an Easter lily and float in an appropriate background. [Drawing must show correct method of procedure to obtain purity of color, accent of lines and balance of color.]

8 State four laws of linear perspective that must be regarded in a drawing containing a house, an avenue of poplar trees, a receding road and a fence drawn parallel to the picture plane.

9 Mention six combinations of two colors each, suitable for use in foliage. Suggest a color to give (*a*) transparency, (*b*) depth, (*c*) warmth and life.

10 Make from memory a drawing of a low glass dish of pansies. [The treatment must show correct method.]

11 Outline a method of teaching "pose drawing" to children.

12 Draw in black and white wash from cast placed by examiner.

## College Department

80TH EXTENSION EXAMINATION

# DEVELOPMENT OF INSTRUMENTAL MUSIC

**Saturday, June 10, 1905 — Three hours only**

---

*Answer 10 questions but* **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Give a brief historical sketch of the development of the essential elements of expression in music.

2 Give an account of the principal sources of early instrumental music and name the kinds of instruments then in use.

3 Mention and describe the essential characteristics (meter, movement, origin etc.) of *four* of the principal dances used in the suite. Name *four* prominent composers of suites, giving nationalities and dates.

4 Mention the essential difference between the suite and the sonata. Give the psychologic reason for the development of the sonata.

5 Describe the formal structure of the simple folk song. Explain the meaning of ternary form.

6 Describe and contrast the contrapuntal and harmonic styles of composition and give an account of the origin of each.

7 Give an outline and description of the first movement (sonata) form.

8 Name in chronologic order the composers mostly concerned in the development of the sonata.

9 Give a sketch of the life of Haydn and describe his work as the Father of the symphony.

10 Give some of the most notable facts in the life of Mozart and state how he specially contributed to the development of music.

11 Describe the personality and character of Beethoven.

12 Define Romanticism and show its effect on both instrumental and vocal music.

13 Give the essential biographic facts connected with the three representative composers of the Romantic School.

14 Contrast the style of Schubert with that of Schumann.

15 Give an account of the relation of Brahms to the music that preceded him and state his aims as a composer.

HIGHER EDUCATION

## Publications

Gaps in the series indicate that the numbers are replaced by later editions or are for other reasons out of print.

**Examination Department reports** 1894-97. O. *75c a vol., cloth.*

Till 1894 these reports formed part of the general University reports, known as the Regents reports. They cover courses of study in secondary schools, examination of professional students, licensing examinations for physicians, dentists, veterinary surgeons and certified public accountants.

Continued in 1898 as reports of College and High School Departments.

*See also* B23.

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Outline of ground covered by state licensing examinations.

Syllabus of Form Study and Drawing. 30p. 32pl. *25c.*

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**X9** Report of Examination Department 1895. 108p. Feb. 1896. *15c.*

**X10** Examination Papers 1896. 502p. Oct. 1896. *50c; small size uniform with previous volumes 25c, boards 50c.*

*See also* Question papers.

**X11** Davis, W: M. (Harvard) State Map of New York as an Aid to the Study of Geography. 28p. Nov. 1896. *5c.*

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Present English entrance requirements of representative colleges and universities. Also discussions on aims and methods in teaching secondary school English.

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**College Department reports** 1898-1903. O. *75c a vol., cloth.*

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K5 Professional Education in the U. S.—General. 54p. 2pl. 1 map. Oct. 1899. *10c.*

K6 ——Theology. 94p. 2pl. Nov. 1899. *10c.*

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K13 Business Syllabus. 62p. Feb. 1900. *10c.*

K14 Professional Examination Papers 1900. 168p. July 1900. *25c.*

K15 Certified Public Accountant Syllabus. Ed. 1. 134p. Sep. 1900. Ed. 2. 52p. June 1903. *15c.*

K16 Director's Report 1900. 104p. Feb. 1901. *20c.*

K17 Professional Examination Papers 1901. 190p. Aug. 1901. *25c.*

K18 Director's Report 1901. 106p. Jan. 1902. *20c.*

K19 Professional Examination Papers 1902. 192p. July 1902. *25c.*

K20 Director's Report 1902. 118p. Mar. 1903. *20c.*

K21 Professional Examination Papers 1903. 200p. July 1903. *25c.*

K22 Director's Report 1903. 188p. 1904. *25c.*

K23 Professional Education in the U. S.—Commercial Education in High Schools. 130p. June 1904. *20c.*

**Higher Education bulletins** 1904-date. O. *To advance subscribers 50c a year.*

K24 Professional Education in the U. S.—Teaching. 266p. Jan. 1905. *35c.*

K25 *In preparation.*

K26 Professional Examination Papers 1904. 192p. 1904. *25c.*

K27 Professional Examination Papers 1905. 194p. Aug. 1905. *25c.*

**Question papers.** For the academic year 1892 (v. 1); 1893 (v. 2); 1894 (v. 3); 1895 (v. 4). D. *25c a volume.*

*See also* X10, X14, X16, K3, K4, K14, K17, K19, K21, K26, K27. Each volume previous to second edition of X16 contained all the Regents question papers of that year in any of the academic, professional law, medical, dental, veterinary, library and extension examinations.

*Published monthly by the*
New York State Education Department
BULLETIN [illegible] [illegible] August 1905

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BULLETIN 96

BIBLIOGRAPHY 39

A SELECTION FROM THE

# BEST BOOKS OF 1904

WITH NOTES

| | PAGE | | PAGE |
|---|---|---|---|
| Prefatory note | 503 | Drama | 516 |
| Reference books | 505 | Essays, history of literature, etc. | 517 |
| Ethics | 505 | Humor | 519 |
| Religion | 505 | Description and travel | 519 |
| Sociology | 506 | History of foreign countries | 523 |
| Education | 508 | American history | 524 |
| Costume | 509 | Biography | 524 |
| Language | 509 | Fiction | 528 |
| Natural science | 510 | Juvenile books | 535 |
| Useful arts | 511 | Biography | 535 |
| Fine arts | 513 | Fiction | 536 |
| Music | 515 | Comparative table | 538 |
| Amusements and sports | 515 | Author index | 539 |
| Poetry | 516 | | |

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# A SELECTION FROM THE BEST BOOKS OF 1904 WITH NOTES

## PREFATORY NOTE

*To the Librarian*

This is an annotated list of 250 books published in the United States in 1904, selected by the book board of the New York State Library and recommended to the public libraries of the State. To aid in choosing small collections of new books three classes are marked: books marked *a*, of which there are 20, are suggested to libraries which must confine their additions within narrow limits; 30 others marked *b* are also proposed to libraries that can buy 50 books; and 50 more marked *c* may be added to *a* and *b* to make up 100 books.

The remaining 150, including some reference books and a few more costly publications, are worthy careful consideration by libraries that can buy more than 100 books and by those wishing to enlarge resources in special subjects. Many of the unmarked works are of the highest merit. It is thought best to inform the smaller libraries about some books which would be of high practical value to them, though probably too expensive to be bought from the ordinary fund. Special circumstances may sometimes justify buying such a book at the sacrifice of several cheaper ones. Occasionally, too, some generous friend or local club expresses a wish to make the town library a substantial gift. If the librarian can make prompt and definite suggestions it is an advantage to the community and the satisfaction of the benefactor is materially increased. *Decimal Classification* numbers as used in the State Library are prefixed as a guide to libraries using this system. For convenience of libraries wishing to use them, Library of Congress printed catalogue card serial numbers are given in note type; also references to reviews.

The following from the *Journal of New Jersey Libraries*, October 1903, applies equally to New York:

> Look at books before buying them, if possible. Advertisements and reviews are both untrustworthy, especially where any library's special needs are to be considered.
>
> Information about importing books, secondhand books, and even about new books which are under consideration, is always cheerfully given, when asked, by the larger libraries in the State.
>
> Do not buy encyclopedias while in process ofpublication. They are aggravations until complete, and can always be bought more cheaply than they are at first offered a few months after publication. Read Eugene Field's story of the "Cyclopedy," and take warning. The same rule holds as to all subscription books. Avoid them. Shun books in parts. They cost more than they are worth to a library. They turn up in secondhand stores a few months after completion at low prices. Deluded purchasers find them white elephants and sell them. *Finest Orations, Noblest Essays, Royal Flim Flams, Huge Anthologies,* and the like all come to the secondhand man. Get them of him, if you must. In a small library they are generally almost useless. In subscription books, cases like this are not uncommon. Maspero wrote several large and learned volumes, in French on Egypt and Chaldea. They were translated and published in three or four volumes in England, costing libraries in this country about $5 each. An American publisher reprints them in 12 small volumes with a few additional colored cuts, on heavier paper and in larger type and offers them through agents for $84—and libraries buy them!
>
> Do not buy "sets" or complete editions of authors. Buy the volumes you need and as you need them. A complete set always includes several volumes you do not need.
>
> Specify the edition you wish of standard books when you can, unless you find a bookseller able and willing to select them wisely for you.

While this list has been prepared with special reference to smaller public libraries, and some of these books are not recommended for school use, it will also be of much service to schools. Almost all the list is available. Any book under the heading "Juvenile" may be bought for academic libraries. But there are some books of fiction found here which serve a legitimate purpose in the public library by providing wholesome entertainment for a very different class of readers, yet have not enough positive value, either as literature or as a spur to historical study, to justify their purchase by the school.

MELVIL DEWEY
*Director*

*Albany, June 30, 1905*

### REFERENCE BOOKS

016 *a* **A. L. A. Catalog,** 8000 Volumes for a Popular Library. 2 pt. pt1, Classed; pt2, Dictionary.
Gov't Print. Off., free to libraries; others 50c

4-32506-7 Based on *Catalogue of A. L. A. Library 1893,* but greatly revised and enlarged, with descriptive notes on large proportion of titles. Follows *Decimal Classification, Expansive Classification* numbers being added in dictionary list.

305 **Strong, Josiah,** *ed.* Social Progress. Baker & T. $1 n

4-9258 Yearbook of information and statistics on economic, social, industrial and religious conditions, including annual survey by competent authorities of social progress of leading nations. Volume for 1905 fuller and more comprehensive.
Dial, 38:326; Arena, 31:663

310 *c* **Hopkins, A. A. & Bond, A. R.** *comp.* Scientific American Reference Book. Munn $1.50

4-30978 Compact handbook of descriptive and statistical material relating to trade, industries, patents, education, international institutions, transportation, armies, navies, government, population, mathematics, mechanics, chemistry, etc. Tables and graphic representations.

780.3 **Grove,** *Sir* **George.** Dictionary of Music and Musicians; ed. by J. A. F. Maitland. New ed. enl. 5v. v. 1.
Macmillan $5 n

4-33126 A–E. Invaluable to amateur and professional. Follows general plan of original ed. (1879) bringing to date (1904) both in names included and authorities cited. Many articles entirely rewritten, but material still valuable carefully preserved. Added illustrations and 20 mediocre portraits.
Ath. 1904, 2:914; Dial, 38:310 (Upton); Nation, 79:463; Spec. 93:740

808.8 *b* **Granger, Edith,** *comp.* Index to Poetry and Recitations. McClurg $5 n

4-24547 Valuable timesaver. Indexes 369 collections of poetry, recitations, orations, dialogues etc., in three alphabets, by title, author and first line. Appendix groups selections for Arbor day, Christmas, Lincoln's birthday, material on noted people, dialogues, pantomimes, parodies etc.

### ETHICS

173 **Wagner, Charles.** By the Fireside. McClure $1 n

4-8571 Plea for family spirit and a realization of the highest possibilities in the family relation.
Bookman, 19:275

### RELIGION

*See also* Juvenile, p. 533

222.11 **Peters, J: P.** Early Hebrew Story. (Crown Theological Lib.) Putnam $1.25 n

4-22966 Bond lectures at Bangor Theological Seminary.

General readers unable to concentrate their attention on minute archeological studies, will find here virtually all they need. The tone is free, reverent and wholesome. *Athenaeum* 1904, 2:692
Nation, 79:416; Spec. 93:228

232 *b* **McConnell, S: D.** Christ. Macmillan $1.25 n

4-6096 An effort to reestimate the person and work of Jesus. Will arouse the interest and respect of every man who values transparent sincerity and unhesitating candor. If the reader will restrain his natural desire to take up the gage frequently flung at him, he will find the book full of moral stimulus. *Outlook* 76, 1:895
Arena, 32:327; Independent, 57:1091

266 **Speer, R. E.** Missions and Modern History. 2v.
Revell $4 n

4-32680 Historical study of influence of Christianity, direct and indirect, on development of thought and political events in India, China, Japan, Armenia, the Philippines, Latin America.
Nation, 79:478

268 *c* **Peloubet, F: N.** Front Line of the Sunday-school Movement. Wilde $1

5-2410 Practical, giving more specific advice as to plan and methods of
3-13941 work than Burton & Mathews' discussion of *Principles and Ideals for*
3-27915 *the Sunday School* or Mead's comprehensive exhibit of *Modern*
*Methods in Sunday School Work.* Courses of study are laid out in
4-34926 two books published by Univ. of Chicago Press 1904, *Outline of a*
*Bible School Curriculum,* by G. W. Pease, and, for younger classes
4-13636 only, *Introduction to the Bible for Teachers of Children,* by G. L.
Chamberlain (220).

## SOCIOLOGY

*See also* Reference books, p. 505

301 *c* **Shaler. N. S.** The Neighbor; the Natural History of Human Contacts. Houghton $1.40 n

4-9148 Points out causes of race antipathy specially in cases of Jew and negro, and endeavors to show how it may be overcome.
Annals of Amer. Acad. 25:135; Nation, 78:416: Outlook, 77:381

325.26 **Page, T: N.** The Negro; the Southerner's Problem.
Scribner $1.25 n

4-34917 Essays, discussing from Southern viewpoint slavery and its results, lynching, disfranchisement, the race question, etc. See also Murphy's *Problems of the Present South,* p. 522
Dial, 38:315 (W. E. B. DuBois)

325.73 *a* **Brandenburg, Broughton.** Imported Americans.
Stokes $1.60

4-28237 Sociologic study. Author and wife lived among Italians of New York East side, went to Italy in steerage, lived in Sicilian peasant family and returned as emigrants. Illustrations from photographs.

The most interesting and important study yet made (1904) of present day immigration into the United States. *Annals of Amer. Acad. of Political and Social Science,* 25:125
Lit. W. 35:375

331.8 **Roberts, Peter.** Anthracite Coal Communities.
Macmillan $3.50 n

4-3603 Study of social and moral conditions among 26 nationalities employed in Pennsylvania mining towns. Maps and photographic illustrations.

2-20192 A work of the same judicious, thoroughgoing quality that we find in Booth's *Life and Labour of the People in London. F. H. Giddings, Polit. Sci. Q.* 19:519

Annals of Amer. Acad. 25:152; Dial, 37:240 (Henderson); Jour. of Polit. Econ. 12:567 (Virtue); Nation, 78:474

331.86 **Kellor, F. A.** Out of Work: a Study of Employment Agencies. Putnam $1.25 n

4-32737 Contribution to problem of domestic service. Reports investigations in New York, Boston, Philadelphia and Chicago and reveals many abuses. Author and eight assistants visited offices both as employers and employees. Suggests remedies.

Amer. Jour. of Soc. 10:558 (Henderson); Critic, 46:279; Dial, 38:156

332.1 *c* **Fiske, A. K.** The Modern Bank. (Appleton's Bus. Ser.) Appleton $1.50 n

4-3601 Brief description of development and modern systems of banking, with chapters on trust companies, savings banks, foreign exchange, safe deposit companies, etc.

Nation, 78:318

338.8 **Montague, G. H.** Trusts of To-day. McClure $1.20 n

4-7543 Impartial statement of the economics and evils of trusts, history of antitrust legislation and consideration of possible statutory remedies. *Pittsburgh*

4-7544 Moody's *Truth about Trusts,* Moody $2, is valuable for reference. It briefly states and analyzes conditions of over 400 active American trusts.

Annals of Amer. Acad. 24:387, 389.

338.8 *b* **Tarbell, I. M.** History of the Standard Oil Company. McClure $5 n

4-35331 Valuable contribution to knowledge concerning development and methods of this great monopoly. Open-minded as to facts, but bases condemnation on assumptions not yet generally granted in business world. Published in *McClure's Magazine,* except appendix 100p.

Atlantic, 95:414 (G. H. Montague); Dial, 38:313; Nation, 80:15; Outlook, 79:394

339 *c* **Hunter, Robert.** Poverty. Macmillan $1.50 n

4-32745 Study of causes, extent and rapid increase of poverty in American cities, with some practical suggestions for improved conditions. By New York settlement worker.

Critic, 46:90; Dial, 38:155; Econ. Jour. 15:97 (Bosanquet); Nation, 80:70; Yale R. 14:86

352 **Steffens, J. L.** The Shame of the Cities. McClure $1.20 n

4-7545 Scathing indictment of municipal corruption in six American cities. Concludes that the business man's use of politics for personal advantage is the root of the evil. Reprinted from *McClure's Magazine.*

Bookman, 19:302; Nation, 79:159; Current Lit. 36:599 (J. W. Chadwick)

352 **Wilcox, D. F.** The American City: a Problem in Democracy. (Citizens' Lib.) Macmillan $1.25 n

4-13651 Devoted mainly to analysis of conditions of city life and changes needed to bring individual to responsibility for government. Two chapters on administrative questions.
Annals of Amer. Acad. 25:137; Dial, 37:167 (Zueblin); Nation, 79:186

352.073 **Goodnow, F. J.** City Government in the United States. (Amer. State Ser.) Century $1.25 n

4-26899 Considers nature and development of cities, relation to state, popular control, council, executive, administration of charities, corrections, schools, public works, finance, police department.
Annals of Amer. Acad. 25:348

353 *c* **Cleveland, Grover.** Presidential Problems. Century $1.80 n

4-27679 Discusses four important issues of his administration: independence of executive; Chicago strike of 1894; bond issues; Venezuelan boundary controversy.
Lit. W. 35:320; Nation, 79:375

360 **Henderson, C: R.** Modern Methods of Charity. Macmillan $3.50 n

4-34918 Comprehensive account of the various systems of relief, public and private, in principal countries of world. Bibliography.
Dial, 38:269

361 *c* **Barton, Clara.** The Story of the Red Cross. Appleton $1 n

4-16176 Early history and account of relief work accomplished in war and disaster during past 25 years.
Lit. W. 35:253.

361 *c* **Devine, E: T:** The Principles of Relief. Macmillan $2 n

4-29696 Discusses principles which should control in giving aid, presents instructive typical cases, sketches some aspects of English and American plans, and describes action in sudden disasters as Chicago fire, Johnstown flood, etc.
A distinct contribution to the literature of scientific philanthropy. Point of view constructive. . . Both for practical worker and scientific student, the authoritative work. *Annals of Amer. Acad.* 25:143

385 *c* **Spearman, F. H.** The Strategy of Great Railroads. Scribner $1.50 n

4-32771 Popular account of origin and management of principal American systems. 11 maps of territory served.
Ath. 1905, 1:629; Dial, 38:196; Nation, 80:39

396 **Richardson, B. J.** The Woman Who Spends. Whitcomb $1 n

4-32175 Aims to make women realize their influence in the economic world and urges them to a sense of responsibility in use of money.

### EDUCATION

*See also* Juvenile, p. 533

370.4 *b* **Briggs, Le B. R.** Routine and Ideals. Houghton $1 n

4-32311 College and school addresses and essays, emphasizing necessity of thorough drill, constrained by inspiring ideals.
Nation, 79:528

370.4 **Wilson, E. C.** Pedagogues and Parents. Holt $1.25 n

4-33207 Suggestive discussion, leavened by humor and good sense, of present educational methods. Written by a parent, for parents.

371.94 *a* **Washington, B. T.** Working with the Hands; being a Sequel to "Up from Slavery." Doubleday $1.50 n

4-12107 Rightly called "Working with the Hands" rather than "Story of Tuskegee." The principle is larger than the institution and he tells something of its wider application. *Dial,* 37:65
Nation, 78:502

372.1 *a* **Martin, E: S.** The Luxury of Children and some other Luxuries. Harper $1.75 n

4-30171 Essays, light and humorous but based on solid truths, maintaining that children are "a gilt edged security" netting entertainment, stimulation and the highest satisfaction.
Dial, 37:425; Nation, 79:467

374 **Davidson, Thomas.** The Education of the Wage-earners. Ginn 75c

4-25704 Account of author's practical experiment in attempt to solve the problem of education among breadwinners of East side of New York. Chapters by editor on life and philosophy of author and continued success of movement since his death.
Nation, 79:524

374 *c* **Lorimer, G: H.** Old Gorgon Graham: More Letters from a Self-made Merchant to his Son. Doubleday $1.50

4-22860 Continues advice of the *Self-made Merchant to his Son* in business and domestic affairs.
Ath. 1905, 1:207; Bookman, 20:157

376.873 **Crawford, M.. C.** The College Girl of America and the Institutions Which Make Her What She Is. Page $1.50

4-30600 Account of history, government, aims, spirit, athletics and social life of principal women's colleges. Several chapters on coeducational and smaller southern colleges. Photographic illustrations.
Lit. W. 35:376

## COSTUME

391 **McClellan, Elisabeth.** Historic Dress in America, 1607-1800. Jacobs $10 n

4-33115 Less entertaining reading than Mrs Earle's *Two Centuries of Costume in America, 1620-1820,* 1903, $5n., but more sumptuously
3-31011 illustrated by colored plates, drawings, halftones and photographic reproductions, and specially valuable for reference use. Text drawn from letters, journals, advertisements and other original sources. Glossary and list of authorities.
Nation, 79:507

## LANGUAGE

407 **Jespersen, Otto.** How to Teach a Foreign Language. Macmillan 90c n

5-2094 Short, practical work by Danish philologist, admirably translated. Advocates "direct" or "natural" method. Rich in pedagogic suggestions.
Ath. 1904, 2:349; Nation, 78:309

421.5 *b* **Lounsbury, T: R.** The Standard of Pronunciation in English. Harper $1.50 n

4-6077 Professor Lounsbury writes entertainingly and from fulness of knowledge on progress of change in pronunciation, and demonstrates that no permanent standard exists.
Dial, 36:400; Lit. W. 35:104; Nation, 78:337

## NATURAL SCIENCE

*See also* Juvenile, p. 534

533.6 **Santos-Dumont, Alberto.** My Air-ships. Century $1.40 n

4-6766 Clear, interesting recital of author's experiences and triumphs as builder and navigator of air ships. Photographic illustrations and diagrams.

Sufficiently technical to be accurate, but not at all abstruse.
*Literary World*, 35:138

Dial, 36:304

546 *c* **Strutt, R. J.** The Becquerel Rays and the Properties of Radium. Longmans $2.40 n

5-6000 Clear, concise presentation of question of relationship between
electricity and matter. Within grasp of average college student.
4-34929 Righi's *Modern Theory of Physical Phenomena; Radio-activity, Ions,*
*Electrons*, Macmillan $1.10n., (530) is somewhat more popular and
4-33383 Rutherford's *Radio-activity*, Macmillan $3.50n., (53) is the most
valuable treatise for advanced students.

Strutt, Nation, 80:100; Nature, 71:172; Rutherford, Ath. 1904, 1:657; Spec. 93:257

551 **Russell, I. C.** North America. (Appleton's World Ser.) Appleton $2.50 n

4-14166 Concerned chiefly with physical geography, and with distribution of plants and animals. Appended chapters on geology and aborigines. Bibliographies, maps and diagrams.
Nation, 79:83; Dial, 37:92; Lit. W. 35:217; Ath. 1904, 2:877

582 **McFarland, J. H.** Getting Acquainted with the Trees. Macmillan $1.75 n

4-10911 A tree lover's chatty information, not a handbook. Its profuse and unusually beautiful photographic illustrations stimulate interest and observation. Published in *Outlook*.
Dial, 36:375; Nation, 78:371

584.15 *b* **Niles, G. G.** Bog-trotting for Orchids. Putnam $2.50 n

4-10080 Interesting sketches of rambles in search of orchids, mainly in the Hoosac valley, with much information on other plants of the region. Appendix on New England orchids. Admirable illustrations, 24 being colored.
*Dial*, 36:356; Nation, 78:371; Sat. Rev. 99:316

590 *b* **Roberts, C: G: D.** The Watchers of the Trails. Page $2

4-14594 Fascinating stories of brute heroes, in which the tragedy of eternal warfare among the lower animals is vividly portrayed.

Avowedly fiction, they are at the same time true, in that the material of which they are molded consists of facts. *Preface*

Ath. 1905, 1:46; Lit. W. 35:161; Nation, 79:32

591.5 **Sharp, D. L.** Roof and Meadow. Century $1.50 n

4-10458 Observations and reflections from city roof and near-by country fields. Birds chiefly, but also cats, squirrels, snakes and human beings are reported.

Dial, 36:359

591.97 *a* **Hornaday, W: T.** The American Natural History. Scribner $3.50 n

4-10958 Popular. Intended to bridge chasm between scientific "zoology" and the "nature studies" of grammar grades. Illustrated by 227 drawings.

Dial, 36:360; Nation, 78:471

595.78 *c* **Comstock, J: H: & A. B.** How to Know the Butterflies of the Eastern United States. Appleton $2.25 n

4-13626 Popular guide. Adapts scientific classification to use of beginners. Drawings and 45 colored illustrations from life. Clear and authoritative. Poetic quotations on butterflies interspersed.

Dial, 36:374

598.2 **Hoffmann, Ralph.** Guide to the Birds of New England and Eastern New York. Houghton $1.50 n

4-10460 More extensive than Chapman's *Bird-life,* describing over 250
2-239 species, but having only small text illustrations. More popular but
4-10745 less complete than Chapman's *Handbook.* A key for each season
and full data as to appearance in the field give it special value for
beginners.

598.2 *c* **Mathews, F. S.** Field Book of Wild Birds and their Music. Putnam $2 n

4-12229 Sketches of 82 New England birds, with 54 full-page illustrations, mainly colored. Easily first as a guide to bird song, the descriptions and notations, from many sources, being equally valuable and interesting. More useful for supplementary reading than as an identification book.

### USEFUL ARTS

*See also* Juvenile, p. 534

602 *b* **Sanford, F. G.** Art Crafts for Beginners. Century $1.20 n

4-34559 Design, thin woodworking, pyrography, sheet metal work, leather work, bookbinding, simple pottery, basketry, beadwork. Rudimentary principles and simple problems. Illustrated by author's drawings and photographs.

Nation, 79:436

608 **Doubleday, Russell.** Stories of Inventors.
Doubleday $1.25 n

4-22875 Popular account of wireless telegraphy, air ships, fast trains and steamboats, life-savers, automobiles, moving pictures, bridge builders, submarine boats, telephony, typesetting machines, artificial ice. Illustrated.
Spec. 93:772

609 **Cochrane, C. H.** Modern Industrial Progress.
Lippincott $3 n

4-36154 Covers a bewildering diversity of subjects, from mining to flying, plowing to printing, transportation by horse to railway and automobile. Encyclopedic, but neither profound in treatment nor remarkable for accuracy. *Nation,* 80:191
405 halftone illustrations.

613.71 **Sargent, D. A.** Health, Strength and Power.
Caldwell $1.75 n

4-27875 Discusses food, air, sleep, bathing, clothing, athletics. Describes and pictures 56 exercises without apparatus, giving definite advice as to fitness for men, women, young, old and middle aged. Author director of Harvard gymnasium.

630 **Powell, E. P.** The Country Home. (Country Home Lib.) McClure $1.50 n

4-37012 Practical, pleasantly written advice on selecting a site, building, water supply, lawns, flowers and fruit and vegetable growing. Photographic illustrations.
Nation, 79:522

633 **Hunt, T: F.** Cereals in America. Judd $1.75

4-37016 Treats structure, composition, varieties, climate, soil, cultural methods, enemies, harvesting, marketing, etc. Textbook, primarily, but useful to intelligent farmer. Author Cornell professor of agronomy.

641 *c* **Low, B. J.** French Home Cooking Adapted to the Use of American Households. McClure $1.20 n

4-34145 Chiefly meats, vegetables, soups, sauces, ragouts etc., with few sweets. Author French woman, long practically acquainted with
4-21737 American conditions. Fox's *Blue Grass Cook Book,* Fox $1.50n., made up of recipes contributed by Southern housewives and varying much in detail of directions, has large number of sweet dishes and breads.
Nation, 80:78

650.7 **Herrick, C. A.** Meaning and Practice of Commercial Education. (Macmillan's Commercial Ser.)
Macmillan $1.25 n

4-22279 History of movement in Europe and America, defense of place and value in school system, sets of illustrative examination papers, bibliography. *Education,* 25:318

4-3739 Haskins's *Business Education and Accountancy,* Harper $2n., in collected essays and addresses urges business training in college and university, dwelling specially on accountancy and banking.
Herrick, Annals of Amer. Acad. 25:349; Haskins, Lit. W. 35:105; Dial, 36:332

654.2 **Story, A. T.** Story of Wireless Telegraphy.
Appleton $1 n

4-22683 Historical, treating quite fully experiments before Marconi. Less
2-9290 of technical explanation than Tunzelmann's *Wireless Telegraphy,*
4-14872 1901 and Bubier's *A. B. C. of Wireless Telegraphy,* new ed. 1904.
Ath. 1905, 1:179; Dial, 38:131

658 *c* **Altmaier, C. L.** Commercial Correspondence and Postal Information. (Macmillan's Commercial Ser.)
Macmillan 75c n

4-17697 Detailed instruction in business letter-writing, with model forms and exercises based on a variety of conditions. Postal information very complete.

666.3 **White, Mary.** How to Make Pottery.
Doubleday $1 n

4-30169 Practical, detailed directions for the untrained worker, taking up clay, tools, glaze, the kiln, the wheel etc. Chapters on Indian and modern American pottery. Illustrated.
Dial, 38:52

689 *c* **Tinsley, L. R.** Practical and Artistic Basketry.
Kellogg $1

4-3931 Elementary, prepared for manual training use. Deals with materials
and methods, and describes many weaves and stitches. Fully
1-25462 illustrated. For full directions for making special articles see
3-11168 White's *How to Make Baskets* and *More Baskets,* 1901-3, Doubleday
$1 n. each. Very full treatment of Indian basketry, historical,
descriptive, illustrative and bibliographic, is given in Mason's
*Aboriginal American Basketry* published in 19th Annual Report of
United States National Museum, $2.25 and republished in two
4-34915 sumptuous volumes by Doubleday $15.
Mason, Nation, 80:219

## FINE ARTS

*See also* Juvenile, p. 534

702 **Froehlich, H. B. & Snow, B. E.** Text-books of Art Education. Bk 1-5.
Prang Educ. Co.
bk 1 and 2, 25c ea. bk 3, 30c. bk 4 and 5, 45c ea.

Short descriptive bits and suggestions in verse and prose, with simple illustrations in black and white and in color, which serve both for copy and illustration of principles of drawing and use of color. Books become more directly instructive as series proceeds.

708.4 **Potter, M. K.** Art of the Louvre.
Page $2 n

4-32673 For traveler and amateur. Brief history of palace, with descriptions and mainly quoted criticisms of oil paintings. Plans and about 50 fair halftones.
Acad. 68:34; Ath. 1905, 1:536; Lit. W. 35:375

709 **Reinach, S.** Story of Art throughout the Ages.
Scribner $2 n

4-37058 History of architecture, sculpture and painting. Remarkable compact, readable, broad in view, sagacious and illuminating in criticism. Nearly 600 very small, clear halftones. German title *Apollo.*
Dial, 38:202; Nation, 80:58

709.453 **Pauli, Gustav.** Venice. (Famous Art Cities)
(Grevel 4/) Scribner $1.50 n

4-32672 After brief summary of history, devoted to description of architecture, sculpture and painting. Profuse and excellent halftones. No. 2 of useful series of art guides translated from the German, No. 1
4-7317 being Engelmann's *Pompeii*.
Pauli, Nation 79:9; Engelmann, Nation 78:351; Ath. 1904, 2:388

712 **Skinner, C: M.** Little Gardens: How to Beautify City Yards and Small Country Spaces.
Appleton $1.25 n

4-13622 Sensible instruction on beautifying city dooryards and small country spaces. Working diagrams and photographs.
Dial, 36:357

716 *c* **Thomas, *Mrs* R. F.** (*Mrs* Theodore Thomas). Our Mountain Garden. Macmillan $1.50 n

4-11546 Practical in garden counsel, and charming in its incidental revelation of the spirit of their New Hampshire summer home.
Dial, 36:356

730 *c* **Sturgis, Russell.** The Appreciation of Sculpture.
Baker & T. $1.50 n

4-27687 Attempts to help general readers to discern the qualities which command admiration in the best ancient and modern sculpture. 64 halftones.
Dial, 37:315; Nation, 79:508

735 **Caffin, C: H:** American Masters of Sculpture.
Doubleday $3 n

3-29875 Appreciations of 11 living sculptors, with essays on the decorative and ideal motives; 30 halftone plates. Libraries should have Taft's
3-30499 comprehensive *History of American Sculpture* (1903) but may well add this fuller treatment of contemporaries.
Caffin, Bookman, 19:67; Dial, 36:151

741 **Baldry, A. L.** Holbein. (Drawings by Great Masters) Scribner $2.50 n

Short introduction and 48 excellent plates, mainly of portraits from Windsor collection.
Ath. 1904, 2:882; Dial, 37:426

741 **Barritt, Leon.** How to Draw. Harper $2 n

4-33593 Sets forth in simple, practical way the basic principles of illustration. Working studies and many reproductions of news and fiction illustrations, cartoons and comics by well known draftsmen.

746 **Goldenberg, S: L.** Lace, its Origin and History.
Brentano $1.50 n

5-77 Simple, comprehensive aid to judgment of lace, primarily for commercial purposes. Alphabetical arrangement by varieties described.
4-33228 Excellent illustrations. Moore's more sumptuous *Lace Book*, Stokes $5n., is historical in treatment, giving interesting associations, with 70 examples, including portraits.
*Dial*, 37:427; Nation, 80:158

746 **White, Mary.** How to Do Beadwork. Doubleday $1 n

4-13300 Clear and simple directions for making chains, belts, bags, purses, candle shades and other articles, by stringing, sewing, knitting, crocheting or handloom weaving.

759.2 **Watts, G: F:** Pictures by George Frederick Watts. (Newnes' Art Lib.) Warne $1.25

64 fair reproductions, 24 p. text, comprising biographic sketch by
W. K. West and essay on his art by Romualdo Pantini. Desirable
2-17247 supplement if library has already Bateman's *G. F. Watts, R. A.*, Bell's
Miniature Ser. Macmillan 50c. A folio containing 23 much better
reproductions with unimportant introduction and poetic selections for
4-26938 each plate is published by Fox, Duffield & Co. $5n., reviewed, *Dial*,
37:372.

778 **Brownell, L. W.** Photography for the Sportsman Naturalist. (Amer. Sportsman Lib.) Macmillan $2 n

4-34110 Instructs in art of photographing wild life of woods, fields and streams in natural surroundings. Chapters on camera, telephotographic lens and dark room. Many reproductions.

### MUSIC

*See also* Reference books, p. 505 Biography, p. 524 *and* Juvenile biography, p. 535

780.97 *c* **Elson, L: C:** History of American Music. Macmillan $5 n

4-6948 From beginnings to date (1904). Religious beginnings, musical organizations, orchestra, opera, chorus, national and folk music, composers, women in music, musical education, criticism, etc. Many portraits and illustrations.

Nation, 78:276; Dial, 36:396; Ath. 1904, 2:129

782.2 **Aldrich, Richard.** A Guide to Parsifal. Ditson $1

4-29219 Popular; treats origin, story, music. Perhaps best guide for non-musical person wishing to prepare for performance. Principal themes, and illustrations from stage settings.

Nation, 79:376

785.1 **Weingartner, Felix.** The Symphony since Beethoven. Ditson $1

4-26135 A distinguished German conductor's brief critical comments on work of Haydn, Schubert, Mendelssohn, Schumann, Brahms, Bruckner, Tschaikowsky, Berlioz, Liszt, Strauss, Mahler.

### AMUSEMENTS AND SPORTS

*See also* Juvenile, p. 535

790 *b* **Kingsland,** *Mrs* **Florence** (*Mrs* Burton Kingsland). The Book of Indoor and Outdoor Games. Doubleday $1.50 n

4-22685 Excellent collection for all ages and occasions, with suggestions for special days, dinners, dances, tableaux and wedding anniversaries. Games mainly with apparatus.

5-5983 Benson's *Book of Indoor Games for Young People of all Ages*, Lippincott $1.50, contains children's games, card games, puzzles, conjuring and directions for making simple toys. Illustrated.

791 **Lewis, A. J.** "Prof. Hoffmann" *pseud.* Later Magic.
Dutton $2 n

4-2983 Up to date (1904) methods, and tricks with tables, wands, watches, rings, handkerchiefs, colors, flags, gloves, eggs, hats etc. Chapters on conjurer's dress and appliances.

796 **Barbour, R. H:** Book of School and College Sports.
Appleton $1.75 n

4-14234 Describes American football, baseball, track and field athletics, lacross, ice hockey, lawn tennis, with rules, vocabularies and records. Appendix gives Harvard-Yale agreement. Illustrated.
Lit. W. 35:197

### POETRY

*See also* Juvenile, p. 535

811.49 **Van Dyke, H: J.** Music, and other Poems.
Scribner $1 n

4-27864 Delicate and graceful in workmanship, the expression of a refined and sensitive poetic instinct rather than the outpourings of a creative mind. *W. M. Payne* in *Dial*, 38:197
Lamp, 29:450; Lit. W. 35:372; Nation, 79:440

821.04 *a* **Child, F. J.** *comp.* English and Scottish Popular Ballads. Cambridge ed. Houghton $3

4-13303 300 of the 305 ballads in Professor Child's 10 v. collection are here represented by at least one version, with short introduction. Notes, list of sources, glossary and index.
Critic, 45:479

821.08 *c* **Page, C. H.** *ed.* British Poets of the Nineteenth Century. Sanborn $2

4-26912 Selections from Wordsworth, Coleridge, Scott, Byron, Shelley, Keats, Landor, Tennyson, the Brownings, Clough, Arnold, Rossetti, Morris, Swinburne. Valuable both to small libraries, unable to afford these poets in full, and to students for reference lists comprising selected editions, biography, criticism, tributes in verse and cited bibliographies.
Nation, 79:356

821.08 **Pertwee, Ernest,** *comp.* Reciter's Treasury of Verse.
Dutton $1.50 n

Serious and humorous selections from about 150 authors, nearly five sixths being British. Introductory essay on the art of speaking. Standard of selection high.
Nation, 79:245

### DRAMA

812.49 **Aldrich, T: B.** Judith of Bethulia. Houghton $1 n

4-34550 This play, written for Miss Nance O'Neill, is in part a dramatization of author's narrative poem, *Judith and Holofernes.*
Bookman, 21:101; Critic, 46:73; Dial, 38:48; Nation, 80:73

822.8 *c* **Phillips, Stephen.** The Sin of David.
Macmillan $1.25 n

4-28979 Of high literary quality. A modern version of the old Hebrew story of David, Uriah and Bathsheba. Scene, England during Cromwellian wars.
Ath. 1905, 1:155; Bookman, 20:554; Critic, 46:91; Dial, 38:47; Nation, 80:72; Spec. 93:837

### ESSAYS, HISTORY OF LITERATURE, ETC.

*See also* Reference books, p. 505

801 **Payne, W: M.** *ed.* American Literary Criticism.
(Wampum Lib.) Longmans $1.40 n

4-25688 Critical extracts from R. H. Dana, Ripley, Emerson, Poe, Margaret Fuller, Lowell, Whitman, Whipple, Stedman, Howells, Lanier, Henry James, with introduction on development of American criticism. Other volumes of series represent, by examples in chronologic sequence, the development of American familiar verse and short stories.
Dial, 38:14; Nation, 79:443

808 **Jordan, M.. A.** Correct Writing and Speaking.
(Woman's Home Lib.) Barnes $1 n

4-31067 Discusses standards, expression in speech and writing, speaking and singing, prose, poetry, spelling, handwriting, grammar, use of the dictionary. Short bibliography. Author professor of English at Smith College.

808.5 **Laycock, Craven & Scales, R. L.** Argumentation and Debate. Macmillan $1.10 n

4-24488 Manual for teachers and students. Discusses principles applicable alike to written and spoken discourse, treating oral argument most fully. Illustrated by fresh and excellent examples.
Nation, 79:377

809 **Ker, W. P.** The Dark Ages. (Periods of Europ. Lit.)
Scribner $1.50 n

4-27335 By wise selection, lucid exposition and occasional happy characterization, maintains interest even for those prepared to find the Dark Ages pretty dull and unprofitable. *Nation,* 80:382
Dial, 37:172; Sat. R. 98:237

811.4 *c* **Rittenhouse, J. B.** The Younger American Poets.
Little $1.50 n

4-32306 Critical study and appreciation, with selections from works, of 18 American poets born since 1850. Portraits and biographical index.
Critic, 46:380

814.41 *c* **Burroughs, John.** Far and Near. Houghton $1.10 n

4-30580 Wild life around author's cabin in the Catskills, a trip to Alaska and a February in Jamaica.
Dial, 38:19; Nation, 79:445; Spec. 94:223

814.49 **Colby, F. M.** Imaginary Obligations. Dodd $1.20 n

4-26102 Short, discursive essays touching on literary and educational matters, social relations, the theater, etc.

He has humor of a very pleasant sort. His writing suggests good talk. *Munroe Smith* in *Bookman*, 20:368

Critic, 45:569; Dial, 38:20

814.49 *b* **Deland,** *Mrs* **M. W. C.** The Common Way. Harper $1.25

4-29361 Familiar talks on everyday relations of life and clash of old and new ideals, social and religious.

814.49 **Perry, Bliss.** The Amateur Spirit. Houghton $1.25 n

4-28230 Other essays: Indifferentism; The Life of a College Professor; College Professors and the Public; Hawthorne at North Adams; Fishing with a Worm.

Dial, 38:93; Nation, 80:138

814.49 *b* **Repplier, Agnes.** Compromises. Houghton $1.10 n

4-24484 As clever and delightfully heretical as her older *Points of View*.

4-13862/3 There is the same felicity of bookish allusion, the same keen edged analysis and unfailing wit. *Dial*, 37:315

Her defense of the spinster neatly offsets the fears entertained in *The Woman Errant*, p. 533.

Ath. 1905, 1:78; Bookman, 20:317; Critic, 45:568; Nation, 79:478

818.4 **Davis,** *Mrs* **R. H.** Bits of Gossip. Houghton $1.25 n

4-27333 Reminiscences of her childhood in the South, the Civil War, Alcott, Emerson, Hawthorne, Holmes, Clay, Fremont and others.

Dial, 37:303; Nation, 79:505; Spec. 94:185

818.4 **Torrey, Bradford.** Nature's Invitation: Notes of a Bird-gazer North and South. Houghton $1.10 n

4-26926 30 short chronicles of discovery attending walks in New Hampshire, Florida, Texas and Arizona.

Dial, 37:317; Nation, 79:316

818.4 *b* **White, S. E:** The Mountains. McClure $1.50 n

4-29782 Describes journey across Californian coast ranges. Chapters on equipment, choosing horses, the trail, seeing deer, camp cookery, tenderfeet, the night wind, etc.

Ath. 1905, 1:334; Bookman, 20:370; Nation, 79:436; Spec. 94:328

820.4 **Stephen, Leslie.** English Literature and Society in the 18th Century. Duckworth 5/

4-13611 The buoyant and energetic style never flags, holding the reader to the close. We have here the quintessence of our 18th century literature—the rich cream of criticism. *Athenaeum*, 1904, 1:392

Acad. 66:216; Spec. 92:669

844.89 *c* **Maeterlinck, Maurice.** The Double Garden. Dodd $1.40 n

4-13663 16 essays ranging from motor cars and gaming tables at Monte Carlo to destiny of human race. Lacking nothing of Maeterlinck's distinctive literary charm, but somewhat less abstract and elusive than his former work. *Pittsburgh*

Acad. 66:634; Ath. 1904, 2:70; Lit. W. 35:252; Spec. 93:290

### HUMOR

.49 **Herford, Oliver.** Rubáiyát of a Persian Kitten.
Scribner $1 n

3103 35 capital cat drawings with accompanying quotations parodying Omar.
Dial, 37:425

*c* **Wells, Carolyn,** *comp.* A Parody Anthology.
Scribner $1.25 n

257 Grouped by poets parodied, from Spenser parodied by Keats to Kipling as echoed by Guy Wetmore Carryl.

### DESCRIPTION AND TRAVEL

*See also* Juvenile, p. 535

.4 *b* **O'Connor, W: D.** Heroes of the Storm.
Houghton $1.50

197 Tales of shipwreck and gallant rescues, selected from official reports of life-saving service. Interest enhanced by marked literary power.
Nation, 79:401

.376 **Platner, S: B.** The Topography and Monuments of Ancient Rome. (Allyn & Bacon's College Latin Ser.)
Allyn $3

269 Introductory, for student of Roman antiquities; discusses topography of each region, locating buildings and monuments and describing those more important. Based largely on Richter's *Topographie der Stadt Rom.* Maps, plans, illustrations.
Amer. Hist. R. 10:617; Ath. 1905, 1:599; Nation, 79:202

**Maxwell, Donald.** The Log of the *Griffin:* the Story of a Cruise from Switzerland to the Thames.
Lane $2 n

Artist's voyage in a yawl from the Swiss Alps through Lake Zurich, the Rhine and to England. 100 drawings, 16 color sketches.
Dial, 38:89; Nation, 80:78; Internat. Studio, 25:118

.1 **Dougall, C: S.** The Burns Country.
(Black 6/) Macmillan $2

281 Brings out historical associations; also traditions connected with other literary men, as well as those pertaining to Burns's life and writings. Map and 50 plates from photographs.

913 Crockett's *Raiderland,* Hodder & S. 6/. Dodd $2, n. (914.140) describes Galloway, its traditions, characters, humors, with 113 Pennell drawings. Another phase of Scotland's literary life is brought out
968 in Hutton's *Literary Landmarks of the Scottish Universities,* Putnam $1.25 n. (378.41); Sharp's sumptuous illustrated essays on
2 *Literary Geography,* Pall Mall 10/6, Scribner $3.50 n. (914.2) touches Scott, Stevenson, Carlyle, and reaches out to English writers, and literary associations in Wales and about Lake Geneva.

Dougall, Ath. 1904, 2:109; Acad. 67:48; Crockett, Ath. 1904, 2:763; Acad. 67:455; Dial, 38:89; Hutton: Nation, 79:416; Sat. R. 99:318; Sharp, Nation, 80:120; Dial, 38:202; Spec. 93:875

914.1 Sanderson, William. Scottish Life and Character; Painted by H. J. Dobson, Described by William Sanderson. (Black 7/6) Macmillan $3 n

5-11590 Readable text, secondary to 20 reproductions in color of Mr Dobson's paintings; represents Scotland's religious, domestic and country life. *Bonnie Scotland*, painted by Sutton Palmer, happily described by A. R. H. Moncrieff, Macmillan $6n. (Black 20/) represents natural scenery; 75 colored plates.
Acad. 67:611; Ath. 1905, 1:118

914.2 Besant, *Sir* Walter. London in the Time of the Tudors. (Surrey of London)
(Black 30/n) Macmillan $7.50 n

5-6023 Supplies lively and accurate information through narrative of events and essays on social usage, trade, costume, the poor, theaters,
3-2034 crime etc. Preceded in series by *London in the 18th Century* and books, hardly within means of small libraries, might well be suggested to patrons wishing to make gifts, as of practical value.
Acad. 67:227; Ath. 1904, 2:581; Nation, 79:459

914.2 Tozier, Josephine. Among English Inns. (Little Pilgrimages Ser.) Page $1.50 n

4-18481 Descriptive guide to attractive haunts of rural England. Selborne, Chagford, Clovelly, Boston and Norwich among places visited.
*Pittsburgh*
Lit. W. 35:252

914.316 Adventures of Elizabeth in Rügen, by the author of "Elizabeth and her German Garden."
Macmillan $1.50

4-3735 Elizabeth, accompanied by her coachman and incomparable maid, makes a 12 days' driving tour round the island of Rügen. A guide full of piquant personal flavors.

914.41 *c* Kean, Martha, *pseud.* A Transplanted Nursery.
Century $1.20 n

4-30967 Summer sojourn of an American family in a villa farmhouse on the coast of Brittany, described in letters home. Illustrated from photographs.
Nation, 79:459

914.56 Elliott, *Mrs* Maud (Howe). Roma Beata: Letters from the Eternal City. Little $2.50 n

4-30960 Highly readable home letters, written during six years' residence. Describes visit to Queen Margaret, presentation to Leo 13, and gives much information about conditions of domestic and social life.
Dial, 37:375; Nation, 79:20

914.7 *b* Ganz, Hugo. The Land of Riddles (Russia of To-day). Harper $2 n

4-32182 Impressions of Austrian traveler, 1904. Report of political and social conditions and estimate of czar of special interest in light of subsequent events.
Ath. 1905, 1:81; Dial, 38:89; Nation, 80:180

914.94 *c* **Rawnsley, H. D.** Flower Time in the Oberland.
(MacLehose 5/n) Macmillan $2

4-19428 Enthusiastic descriptive essays on Switzerland in May, each headed by a sonnet. 12 illustrations from drawings by Mrs Edith Rawnsley.
Nation, 78:351; Sat. R. 97:498

914.96 **Garnett, L. M. J.** Turkish Life in Town and Country.
(Our Europ. Neighbours) Putnam $1.20 n

4—2346 Official and domestic life, social institutions, education, religion, nomad and brigand life, among Mohammedan Turks, Albanian, Macedonian, Armenian and Hebrew communities.

915.1 **Townley, Susan,** *lady.* My Chinese Note Book.
Dutton $3 n

5—10423 Entertaining, including brief sketch of history and religions and observations on court life, the Dowager Empress, Manchu princesses, people, manners and customs. Map and illustrations.
Ath. 1905, 1:12; Nation, 79:335; Spec. 93:742

915.18 **Hosie, Alexander.** Manchuria: its People, Resources and Recent History.
(Methuen 7/6 n) Scribner $2.50 n

3-8875 Careful account of physical features, agricultural and mineral products, people and industries. Preface dated 1900, but still of great service toward understanding of Russo-Japanese conflict. Folding map, plates, tables.

4-33400 Weale's *Manchu and Muscovite,* Macmillan $3n., though of less permanent value, is a useful and more popular survey, which strongly condemns Russian policy. Events have proved its prophecies much
4-14557 more correct than those of Whigham's *Manchuria and Korea,* Scribner $2n., which concludes "that as far as Manchuria is concerned, Russia is now more or less invulnerable."
Hosie, Nation, 79:36; Weale, Nation, 79:140; Ath. 1904, 2:38; Whigham, Ath. 1904, 1:368

915.19 *c* **Hamilton, Angus.** Korea. Scribner $1.50 n

4-24775 Describes people, customs, social and political conditions. Author, English correspondent, some years resident in Far East. Introduction estimates strategic resources of Japan and Russia, December 1903. Map and illustrations.
Ath. 1904, 1:200; Spec. 92:258; Acad. 66:94; Lit. W. 35:101; Dial, 36:265

915.2 **Knox, G: W:** Japanese Life in Town and Country.
(Our Asiatic Neighbours) Putnam $1.20 n

4-29700 Much more of history and influences of older thought than usual in this descriptive series. Author prominent student of Japanese Confucianism. Map and photographic illustrations.
Dial, 37:369 (Griffis); Nation, 79:402

915.4 *c* **Compton, Herbert.** Indian Life in Town and Country. (Our Asiatic Neighbours) Putnam $1.20 n

4-25399 Series of lively and graphic essays describing Indian native life and Anglo-Indian life. *Nation,* 79:417
Author long resident in India.
Dial, 37:277

917.1 **Bradley, A. G.** Canada in 20th Century.
Dutton $4 n

4-9728 By an Englishman who has lived in Canada. Furnishes valuable information in regard to social and agricultural conditions and points out inducements offered to English emigrants. *Pittsburgh*
Map and 50 halftone plates.
Acad. 66:7; Dial, 37:113; Nation, 78:132; Sat. R. 97:114; Spec. 93:123

917.3 *c* **McCracken, Elizabeth.** The Women of America.
Macmillan $1.50 n

4-33396 Outcome of journey undertaken to investigate achievements and ideals of women, in professions, public affairs, arts, and specially in the home and its affairs. Reprinted from *Outlook*.
Critic, 46:281

917.3 *b* **Münsterberg, Hugo.** The Americans. McClure $2.50 n

4-35738 Popular philosophic study of American political, economic, intel-
lectual and social life. Written for Germans, it complements his
1-26925 *American Traits*, addressed to Americans.
Amer. Jour. of Sociology, 10:245; Dial, 38:147; Nation, 79:163, 80:12

917.445 **Pickard, S: T:** Whittier-land: a Handbook of North Essex.
Houghton $1 n

4-10894 Identifies and describes places and many persons associated with
Whittier's life and poems. 56 excellent illustrations from photo-
graphs. An interesting study of his religious ideas is given in
4-30605 Hawkins's *Mind of Whittier*, Whittaker 80c n. (811.36)

917.5 **Johnson, Clifton.** Highways and Byways of the South.
Macmillan $2 n

4-30608 Impressions of rustic life among poor whites and negroes of Southern States east of the Mississippi. Many photographic illustrations.
Ath. 1905, 1:622; Dial, 37:428; Nation, 80:79

917.5 *a* **Murphy, E. G.** Problems of the Present South.
Macmillan $1.50 n

4-8288 Broad minded, hopeful discussion. Presents strongly case against child labor; condemns lynching; urges need of good common school system. Author Southern by birth and experience. Should be read with Booker Washington's volumes and Du Bois's *Souls of Black Folk*, for an all-round view of negro question.
Murphy. Atlantic, 94:547 (B. Washington); Dial, 37:88; Nation, 78:317; Outlook, 76:967

917.8 **Thwaites, R. G.** A Brief History of Rocky Mountain Exploration. (Expansion of the Repub. Ser.)
Appleton $1.25 n

4-2502 Outlines pioneer journeys from Balboa's crossing of Darien to con-
struction of Pacific railways, giving main space to Lewis and Clark
expedition. For full, handsomely illustrated history of this expedi-
tion, with identifications and statement of changes in regions
4-18634 traversed, see Wheeler's *Trail of Lewis and Clark, 1804-1904*, 2 v.,
Putnam $6n. For short outline, with compact statement of present
political and industrial conditions of the territory, see Hitchcock's

3027 *Louisiana Purchase and the Exploration, Early History and Building of the West,* Ginn $1.25.
Thwaites, Dial, 36:261; Wheeler, Nation, 79:12; Dial, 37:112; Hitchcock, Dial, 36:262; Acad. 67:127

.91 **Burdick, A. J.** The Mystic Mid-region; the Deserts of the Southwest. Putnam $2 n

1511 Interesting description of wonders, fascination, dangers, hardships and possibilities of arid western region, and particularly of Mojave and Colorado deserts. 55 illustrations from photographs.
Dial, 37:273; Nation, 78:391

### HISTORY OF FOREIGN COUNTRIES

.8 **Maurice, A. B. & Cooper, F: T.** The History of the 19th Century in Caricature. Dodd $2.50 n

487 *Bookman* articles, revised and amplified, with many added cartoons. Deals mainly with political history of France, Germany, England and America.
Bookman, 19:390

**Munro, D. C.** A Source Book of Roman History. Heath $1

84 Not a continuous narrative, but a selection of extracts from original authorities on history, religion, institutions and society, with full bibliographic references.

.03 **Bateson, Mary.** Mediaeval England. (Story of Nations) (Unwin 5/) Putnam $1.35 n

79 Authoritative, popular account of English society from 1066 to 1350, describing court, nobility, clergy, learning, art, education, and town and country life. *W. Dawson Johnston*
Acad. 66:96; Dial, 36:331; Nation, 79:41; Sat. R. 99:21

.34 **Carey, E. F & Wimbush, H: B.** The Channel Islands. (Black 20/) Macmillan $6 n

591 Attractive and useful on locality not hitherto popularly covered. Concerned with history, feudal survivals, folklore, customs, natural features. 76 color prints from paintings of scenery and life. Map.

*c* **Asakawa, Kanichi.** The Russo-Japanese Conflict: its Causes and Issues. Houghton $2 n

112 Clear, logical presentation of causes leading up to present struggle, diplomatic negotiations, and issues at stake. Author, Japanese lecturer on East Asian history and civilization at Dartmouth.
Dial, 38:9; Nation, 80:98

*a* **Okakura Kakuzo.** Awakening of Japan. Century $1.20 n

632 Briefly sketches political and intellectual history, pointing out that the new Japan is the outcome of inherent forces and ideals and that western influences should in many instances be resisted.
Dial, 38:40; Nation, 79:509

952 *a* **Seaman, L: L.** From Tokio through Manchuria with the Japanese. Appleton $1.50 n

4-34136 Narrative of personal adventure at or near front in Russo-Japanese War, with special attention to Japanese hospital service and sanitary precautions in field. Author United States military surgeon.
Critic, 46:471; Dial, 38:10; Nation, 80:216

### AMERICAN HISTORY

973 *b* **Colquhoun, A. R.** Greater America. Harper $2.50 n

4-9147 Discusses American interests in Asia, the Pacific and the Caribees, problems of national defense, expansion, colonization and government of dependencies. Maps.
Amer. His. R. 10:457; Ath. 1904, 1:619; Dial, 37:65; Nation, 79:167; Spec. 93:16

973 **Hart, A. B.** *ed.* The American Nation: a History from Original Sources by Associated Scholars. 28v. v. 1-5, Foundations of the Nations. Harper $9 n

Sold separately, University ed. $2 each, Library ed. $2n. each.
4-32405 v. 1 European Background of American History, 1300-1600, by E. P. Cheney.
4-32335 v. 2 Basis of American History, 1500-1900, by Livingston Farrand.
4-31309 v. 3 Spain in America, 1450-1580, by E. G. Bourne.
4-32336 v. 4 England in America, 1580-1652, by L. G. Tyler.
4-32334 v. 5 Colonial Self-government, 1652-1689, by C. M. Andrews.
By specialists, based on original sources, for general reader. Thus far takes high rank. Frontispieces, 35 maps. v. 1 of Avery's
4-32329 *History of the United States and its People,* is very handsome in form, profusely supplied with significant illustrations and admirably executed tinted maps. Text readable and generally in accord with best authorities.

973 **Sparks, E. E.** The United States of America. 2v. v.1, 1783-1830; v.2, 1830-1900. (Story of Nations) (Unwin 5/ each) Putnam $1.35 n each

4-32659 Not narrative of events, but interpretation of history in its consecutive phases. Maps and well chosen illustrations.
Amer. Hist. R. 10:883; Nation, 80:217

973.784 *c* **Pryor,** *Mrs* **R. A.** Reminiscences of Peace and War. Macmillan $2 n

4-29211 These reminiscences, like Mrs Clay-Clopton's entitled *A Belle of*
4-25117 *the Fifties,* Doubleday $2.75n., (917.5) deal with matters social and political in Washington and the South from 1852-66. Mrs Pryor's give the fuller portrayal of domestic life. Both are entertaining and typical Southern in viewpoint.

### BIOGRAPHY

*See also* Juvenile, p. 535

*Armstrong.* **Talbot,** *Mrs* **E. A.** Samuel Chapman Armstrong. Doubleday $1.50 n

4-3406 Simple, sincere story of the life of the founder of Hampton Institute for negroes and Indians.
Dial, 36:143; Nation, 78:294

*Arnold.* **Dawson, W: H.** Matthew Arnold and his Relation to the Thought of our Time. Putnam $1.75

4-7334 Careful exposition of teachings on culture, religion and politics.
4-5427 Russell's *Matthew Arnold,* Scribner $1n., written from intimate
personal knowledge, gives fuller picture of the man, studies his
method, and surveys effect produced by writings. Both are fairer
2-25027 and less critical than Paul's *Matthew Arnold* (1902), Macmillan
75c n.

Dial, 37:200; Sat. R. 98:140; Dawson, Nation, 78:318; Russell, Ath. 1904, 1:496; Spec. 92:779; Paul, Ath. 1902, 2:273; Dial, 33:157; Nation, 75:212

**Bancroft,** *Mrs* **E.. D.** (*Mrs* George Bancroft). Letters from England, 1846-1849. Scribner $1.50 n

4-7878 Familiar account of social experiences while her husband, George Bancroft the historian, was American minister at London.

Dial, 36:301; Ath. 1904, 1:624; Spec. 92:781

*Beethoven.* **Shedlock, J. S.** Beethoven. (Bell's Miniature Ser. of Musicians 1/n each) Macmillan 50c

4-26133 Admirable birdseye view of principal facts about the composer's life and works. For characterization of this excellent, cheap, illustrated series, see *Nation,* 78:436.

*Browning.* **Dowden, Edward.** Robert Browning. (Temple Biog.) (Dent 4/6 n) Dutton $1.50 n

4-19421 Specially interesting as study of poems, narrating events of life as related to and interpreting them.

Acad. 66:271; Dial, 37:267; Spec. 92:774

*Burne-Jones.* **Burne-Jones, G.** *lady.* Memorials of Edward Burne-Jones, 1833-1898. 2v. Macmillan $6 n

4-37057 As a record of his career, and particularly of his social life, the book is complete. Of criticism there is little or none. The writer, the talker, the letter writer—brilliant all three—lives in these pages. *Academy* 67:586

Excellent illustrations, including pictures, studies, and portraits of the painter and his friends.

Atlantic, 95:423

*Charles 2.* **Airy, Osmund.** Charles 2. (6/6 n) Longmans $2.25 n

4-31687 Since Charles's cleverness has dazzled several recent writers, it is interesting to see the old view of his character set forth with fresh force and justified by an overwhelming weight of evidence. *Nation,* 79:118

Originally published by Goupil, 1901, in fine editions only, at 63/n. and 160/n.

Ath. 1901, 2:515; Spec. 87:187

*Chaucer.* **Tuckwell, W.** Chaucer. (Bell's Miniature Ser. of Great Writers 1/n each) Macmillan 50c

The little volumes of this series, which already includes Garnett's *Coleridge* and Salt's *De Quincey* deserve high praise for literary treatment, compact array of facts and creditable illustration, at very low price.

Acad. 67:383; Ath. 1905, 1:82; Spec. 93:523

**Conway, M. D.** Autobiography, Memories and Experiences of Moncure Daniel Conway. 2v.
Houghton $6 n

4-29207 Contains reminiscences of most prominent men of his time in England and America. His experience among famous people and historical movements has been rich and varied.
Ath. 1904, 2:757; Dial, 37:229; Nation, 79:358

*c Edgeworth.* **Lawless, Emily.** Maria Edgeworth (Eng. Men of Letters) Macmillan 75c n

4-28552 Unlike most of the series in being mainly a study of personality with little attempt at literary criticism. Emphasizes Irish life.
Acad. 67:46; Ath. 1904, 2:408; Dial, 37:170; Nation, 79:299; Sat. R. 98:390

*Elgar.* **Buckley, R. J.** Sir Edward Elgar. (Living Masters of Music Ser.) Lane $1 n

5-8668 Sketch of personality and enthusiastic appreciation of achievements as composer. List of works, portraits and illustrations.
Nation, 80:380; Spec. 93:644

*Fleming.* **MacBean, L.** Marjorie Fleming: the Story of Pet Marjorie. Putnam $1.40 n

The child's life, containing new extracts from her journal, letters and verses, and portraits. Dr John Brown's charming essay immortalizing her friendship with Sir Walter Scott appended.
Acad. 66:100; Dial, 38:52

**Laut, A. C.** Pathfinders of the West. Macmillan $2 n

4-33584 Romantic and adventurous lives of Radisson, Le Verendrye, Hearne, Mackenzie, Lewis and Clark. Not merely authentic, founded on original documents, but vivified by the touch of an artist.
*Dial,* 38:353
Nation, 80:318

*b Lee.* **Lee, R. E.** Recollections and Letters of General Robert E. Lee. Doubleday $2.50 n

4-27138 Contains comparatively little that is new regarding his military conduct, but much that is interesting about his family life and post-bellum career. *Nation,* 80:55
Acad. 67:502; Dial, 37:235

**Lee, Sidney.** Great Englishmen of the 16th Century.
Scribner $1.75 n

4-33402 Studies, based on Lowell lectures, of characters and careers of More, Sidney, Raleigh, Spenser, Bacon and Shakspere. Chapter on spirit of 16th century, bibliographic notes, portraits.
Acad. 67:500; Nation, 80:332; Sat. R. 99:420

**McCarthy, Justin.** An Irishman's Story.
Macmillan $2.50 n

4-21605 Supplement to *Reminiscences,* but of independent interest, giving account of early journalistic career in Ireland and England, and political life in Parliament during home rule agitation.
*A. L. A. Booklist*
Atlantic, 95:427; Dial, 37:421; Nation, 79:401; Sat. R. 99:422

*Millet.* **Tomson, Arthur.** Jean François Millet and the Barbizon School. Macmillan $3.25 n

4-489 First half devoted to Millet. Chapters on Dupre, Diaz, Rousseau and influences of romantic school. Over 50 good halftone plates.
Spec. 92:158

*a Nast.* **Paine, A. B.** Thomas Nast: his Period and his Pictures. Macmillan $5 n

4-33591 Concerned mainly with the great political caricaturist's work, the book outlines history and conditions in the United States from 1860-96. Over 400 reproductions.
Nation, 80:141

*Newman.* **Barry, William.** Newman. (Literary Lives) Scribner $1 n

4-6911 Sympathetic study and estimate of Cardinal Newman as a man of letters. Portraits and illustrations.
On the whole, the best thing that has been written about Newman.
*Athenaeum,* 1904, 1:777
Acad. 66:424; Dial, 37:240; Spec. 93:457

*b Prescott.* **Ogden, Rollo.** William Hickling Prescott. (Amer. Men of Letters) Houghton $1.10 n

4-8287 Supplements Ticknor's standard biography, bringing out more freely the historian's personality.
Dial, 37:208; Nation, 78:357

*b Roosevelt.* **Leupp, F. E.** The Man Roosevelt: a Portrait Sketch. (Appletons' Hist. Lives Ser.) Appleton $1 n

4-3970
4-3974 This title and that of Riis's *Theodore Roosevelt the Citizen,* Macmillan $2n., might well be exchanged since Mr Riis's book deals rather with the President's personal qualities, Mr Leupp's mainly with his public acts. Both give favorable estimate, Mr Riis's being highly eulogistic.
Bookman, 19:182; Dial, 36:190; Nation, (Leupp) 78:178; (Riis) 79:205

**Ruskin, John.** Letters to Charles Eliot Norton. 2v. Houghton $4 n

4-33240 Tragic record of the perplexities of a great and generous soul, the troubles of a tender heart, the spendthrift use and at last the failure of exceptional powers. *Charles Eliot Norton* in preface
Atlantic, 95:425; Bookman, 20:455; Dial, 37:417; Nation, 80:36; Spec. 92:407

**Schley, W. S.** Forty-five Years under the Flag. Appleton $3 n

4-25115 Author's boyhood and naval service in Civil War, Far East, Greely relief expedition and Spanish-American War, with dignified statement justifying course during blockade of Cienfuegos and battle of Santiago.
Dial, 37:369; Gunton, 27:519; Lit. W. 35:374

**Spencer, Herbert.** Autobiography. 2v. Appleton $5.50 n

4-10065 Will live, by reason of its intellectual elements, and because it is the candid record of the life and thought of one who has made a great contribution to the intellectual history of the race.
*Bookman,* 19:388
Ath. 1904, 1:583; Dial, 36:288; Nation, 79:35; Spec. 92:810

*c* **Thackeray, W: M.** Letters to an American Family.
Century $1.50 n

4-17699 Reveals a kindly personality, bubbling over with gaiety, sparkling fun and badinage. Written during and after his American lectures. Drawings by author.

4-7846 *Thackeray,* Pott 75c. like other *Bookman Biographies* is valuable for number and excellence of illustrations; the accompanying essays by G. K. Chesterton and Lewis Melville are very fragmentary.
Acad. 67:335; Ath. 1904, 2:550; Dial, 38:187; Spec. 92:257

*c Titian.* **Gronau, Georg.** Titian and his School. (Lib. of Art) (Duckworth 7/6 n) Scribner $2 n

5-4542 Clear picture of the artist and the man, with up to date attributions. Bibliography. annotated catalogue of paintings, 54 halftone plates. Best popular handbook. *Athenaeum,* 1904, 2:355
Acad. 67:389; Bookman, 20:556; Dial, 38:322; Sat. R. 99:20

**Vambéry, Arminius.** The Story of my Struggles. 2v.
Dutton $5 n

5-4476 Vambéry is (1905) an eminent Hungarian traveler, linguist and political student. A record of extraordinary adventures in Asia and of friendships with many distinguished people. Contains much valuable information on Eastern question. *Pittsburgh*
Ath. 1904, 2:689; Contemp. R. 87:143; Dial, 38:267; Nation, 80:295

## FICTION

*See also* Juvenile, p. 536

**Adams, Andy.** A Texas Matchmaker. Houghton $1.50

4-9634
3-12817 Leading character an old cattleman living in semifeudal manner on a Texas range. Story told by hero of *The Log of a Cowboy.*
Dial, 37:41; Lit. W. 35:201

**Brown, K. H.** Diane: a Romance of the Icarian Settlement on the Mississippi River. Doubleday $1.50

4-30145 A composite of the French communistic experiment and the workings of the Underground Railroad in 1856 forms background of love tale.
Acad. 68:128; Ath. 1905, 1:237; Nation, 79:528; Sat. R. 99:280

*c* **Churchill, Winston.** The Crossing. Macmillan $1.50

4-11535 Pictures sweeping of civilization across the Alleghanies and settlement of Mississippi valley. Hero's love story subordinated to history of times.
Ath. 1904, 2:266; Critic, 45:187; Dial, 37:38; Nation, 79:121; Spec. 93:124

**Conrad, Joseph & Hueffer, F. M.** Romance.
McClure $1.50

4-10852 Breathless adventures among Cuban pirates and buccaneers, 100 years ago.
Dial, 37:37; Nation, 79:121; Sat. R. 97:209; Spec. 92:21

*c* **Conrad, Stephen,** *pseud.* (Stephen Conrad Stuntz). The Second Mrs Jim. Page $1

4-14153 Unpretentious tale, rather humorously told in first person by a cheerful, tactful, middle-aged woman who marries a well to do farmer with two boys.
Lit. W. 35:201

*b* **Daskam, J. D.** (*Mrs* Selden Bacon). Memoirs of a Baby. Harper $1.50

4-9116 Gently satirizes modern methods of child rearing and demonstrates the average baby's ability to maintain its individuality.
Bookman, 19:395

*a* **Duncan, Norman.** Doctor Luke of the Labrador. Revell $1.50

4-31009 Life of Labrador fisher folk. Though it can not but recall the work of the missionary physician Dr Grenfell, the hero in no sense represents him.
Critic, 45:473; Nation, 80:91

*a* **Glasgow, E. A. G.** The Deliverance: a Romance of the Virginia Tobacco Fields. Doubleday $1.50

4-1646 Carefully written romance of Virginia since the Civil War, in which class pride, revenge and love are the developing forces.
Bookman, 19:73; Critic, 44:375; Dial, 36:119; Lit. W. 35:48; Nation, 78:234

*c* **Gordon, C: W:** "Ralph Connor" *pseud.* The Prospector: a Tale of the Crow's Nest Pass. Revell $1.50

4-35335 Trials and triumphs of a muscular young missionary among cowboys and fortune hunters of Canadian Far West.
Acad. 67:659; Ath. 1905, 1:43; Spec. 94:57

**Grant, Robert.** The Undercurrent. Scribner $1.50

4-27986 Discusses divorce. Favors decision of remarriage question on merits of individual cases, giving claims of personal happiness high
4-35727 value. Paul Bourget's *A Divorce,* Scribner $1.50, shows that, even though the marital tie be legally broken, no complete escape from it is possible for a woman whose first husband still lives.

*c* **Harland, Henry,** "Sidney Luska" *pseud.* My Friend Prospero. McClure $1.50

4-2143 A real princess, a young nobleman, a fairy godmother and a naïve, delightful child play out a diverting comedy against a sunny Italian landscape.

*c* **Hawkins, A. H.** "Anthony Hope" *pseud.* Double Harness. McClure $1.50

3-32406 Story of the misunderstandings, wrongs and unhappiness of six married couples in English society.

The lesson of the tale is that marriage need seldom be a complete failure, though it is seldom a brilliant success. *Spectator,* 93:364
Ath. 1904, 2:344; Bookman, 20:363; Dial, 37:313

*a* **Herrick, Robert.** The Common Lot. Macmillan $1.50

4-24576 Study of a young Chicago architect's temptation to yield his ideals to the lures of commercialism and greed. First published in *Atlantic.*
Bookman, 20:220; Dial, 37:311; Nation, 79:380

**Hewlett, Maurice.** The Queen's Quair.
Macmillan $1.50

4-12092 The six years between Mary Stuart's departure from France and the night she rode a prisoner from Holyrood to Lochleven.
*Nation,* 79:14

As portraiture, a piece of extraordinarily fine and subtle drawing. The style of writing is soaked in the hardy roughness of the time. *Saturday Review,* 98:53
Acad. 66:684; Spec. 93:21

**Housman, Laurence.** Sabrina Warham, the Story of her Youth. Macmillan $1.50

4-21731 Story of English coast, of cruel seas, quiet downs and smiling farmsteads. As the landscape, so the figures, lurid, grave, homelike.
*Nation,* 79:440

Reminiscent of Thomas Hardy at his best.
*Saturday Review,* 98: sup. Oct. 15, p. 3
Spec. 93:601

*b* **Howells, W: D.** Son of Royal Langbrith.
Harper $2

4-27128 Presents a delicate moral problem, involved in suppression of truth about a man unworthy the respect paid him after death. Scene a New England town.
Bookman, 20:372; Critic, 46:184; Dial, 37:310; Nation, 79:419; Spec. 92:22

*b* **Jordan, Elizabeth.** May Iverson—her Book.
Harper $1.50

4-29183 Convent school stories in the manner of a girl of 14 with literary ambitions. Blends cleverly childish frankness, conscious effort and gush.
Critic, 45:571; Lit. W. 35:381

*a* **Kelly, Myra.** Little Citizens. McClure $1.50

4-29195 A New York school teacher's stories of her East side Jewish charges. Human nature and American Yiddish dialect are alike faithfully rendered.
Acad. 66:336; Lit. W. 35:327; Nation, 80:379

**King, Basil.** The Steps of Honor. Harper $1.50

4-9500 Plot concerns a young Harvard instructor guilty of plagiarism.

**Kipling, Rudyard.** Traffics and Discoveries.
Doubleday $1.50

4-27127 Characteristic short stories dealing with South African War, navy, army reform and the supernatural. Each story preceded by a poem embodying theme.
Bookman, 20:155; Critic, 45:472; Nation, 79:379; Ath. 1904, 2:476; Spec. 93:556

*c* **Kirk, *Mrs* Ellen (Olney).** "Henry Hayes" *pseud.* The Apology of Ayliffe. Houghton $1.50

4-21723 Love affairs of a young New York girl brought up by four aristocratic elderly aunts.

**Lane, E. M.** Nancy Stair. Appleton $1.50

4-14154 Love story of a beautiful Scotch girl of noble blood, saucy wit and a poetic gift which she dares try with Robert Burns.
Bookman, 19:600; Dial, 37:41; Lit. W. 35:201

**Lincoln, J. C.** Cap'n Eri: a Story of the Coast. Barnes $1.50

4-6248 Story of three jolly retired Cape Cod sea captains, forced into matrimony to escape the hardships of their own housekeeping. *Pittsburgh*
Bookman, 19:511; Dial, 36:369

**Lloyd, Nelson.** Soldier of the Valley. Scribner $1.50

4-25389 Pictures simple country life, love affairs, and affection between two brothers. Hero a young man returned crippled from Spanish War.
Ath. 1904, 2:802; Lit. W. 35:331

**Martin, H. R.** Tillie: a Mennonite Maid. Century $1.50

4-3734 Quaint story of an attractive Pennsylvania Dutch girl, whose aspirations rise above her sordid surroundings through the influence of her teacher, a Kentucky gentlewoman.
Critic, 45:190; Dial, 36:373

**Michelson, Miriam.** In the Bishop's Carriage. Bobbs-Merrill $1.50

4-9457 Heroine an adroit thief who becomes a morally respectable vaudeville actress. A clever picaresque, unmoral perhaps, but not immoral since it never blurs distinction between right and wrong.
Bookman, 19:303; Acad. 67:615; Critic, 45:184.

*b* **Mitchell, J: A.** Villa Claudia. Life Pub. Co. $1.50

4-12097 A light story for an idle hour, but of marked literary quality, pervaded by a supernatural element and a haunting moral. Leading characters modern Americans in one of Horace's villas.
Critic, 45:184; Lit. W. 35:169

*b* **Mitchell, S. W.** The Youth of Washington told in the Form of an Autobiography. Century $1.50

4-27370 A triumph of pseudo-autobiography, based on long and careful study of its subject and interweaving so skilfully Washington's own words that absolute fact and scarcely less truthful fiction are inseparable.
Arena, 32:669; Acad. 68:63; Critic, 46:283

**Rickert, Edith.** The Reaper. Houghton $1.50

4-21725 Tale of toil, peril, self-sacrifice and love among the rugged crofter fishermen of the Shetland isles.
Bookman, 20:365; Nation, 79:420

**Roberts, C: G: D.** Prisoner of Mademoiselle. Page $1.50

4-26863 Love tale of Acadia, in which an English officer becomes prisoner of French governor's niece.
Acad. 68:14; Sat. R. 98:802

**Robins, Elizabeth, "C. E. Raimond"** *pseud.* The Magnetic North. Stokes $1.50

4-6736 Tale of unsuccessful gold seekers in the Klondike. Grim, gaunt, vivid and interesting.
Ath. 1904, 1:399; Dial, 37:39; Spec. 1904, 1:459

*c* **Seton, Ernest Thompson.** Monarch, the Big Bear of Tallac. Scribner $1.25 n

4-27989 Evolution from an affectionate and mischievous little household pet into the mysterious and ruthless sheep killer of Tallac.
*Dial*, 37:374

**Shafer, S. A.** Day before Yesterday. Macmillan $1.50

4-4978 Lifelike records of a group of children in a quiet, old-fashioned western village, a generation ago. Main appeal to adults.
Dial, 36:372; Sat. R. 98:276

*c* **Sinclair, May.** The Divine Fire. Holt $1.50

4-25675 Hero, an obscure London poet, overcomes cockney breeding, sordid surroundings and strong passions through the inspiration of a well born young Englishwoman whom he loves. Second printing on better paper than first.
Bookman, 20:553, 21:66; Critic, 46:183; Nation, 79:419; Spec. 93:1089.

**Sinclair, Upton.** Manassas. Macmillan $1.50

4-23761 Less a novel than a history. Traces causes of Civil War as far back as Mexican War, and closes with battle of Bull Run.
Dial, 38:15; Lit. W. 35:327; Nation, 79:441.

**Strang, Herbert.** The Light Brigade in Spain. Putnam $1.50

5-11900 Adventure during Sir John Moore's retreat on Corunna and battle of Saragossa. Good reading for boys, distinctly above Henty grade. English title: *Boys of the Light Brigade.*
Spec. 93:872

*a* **Thurston, K. C.** The Masquerader. Harper $1.50

4-28203 John Chilcote M. P., secretly a slave to morphia, secures a physical double, strong willed and clean lived, to substitute during his lapses. Impossible but absorbing.
Ath. 1904, 2:546; Bookman, 20:553; Critic, 45:572; Dial, 38:18; Nation, 79:380

**Truscott, L. P.** The Mother of Pauline. Appleton $1.50

4-17924 Problem story concerned with the acknowledgment of an illegitimate child. Wholesome in tone and treatment.
Bookman, 20:58; Dial, 37:42; Lit. W. 35:258

**Waller, M. E.** The Wood-carver of 'Lympus. Little $1.50

4-8582 Love idyl of the Green mountains. An ambitious farmer crippled in early manhood finds interests in the outside world through a chance acquaintance, and becomes a wood carver of renown.
Dial, 36:372; Lit. W. 35:168; Nation, 78:395.

**White, S. E:** Blazed Trail Stories and Stories of Wild Life. McClure $1.50

4-25386 Vivid, rapid tales of the rough and lawless life of ranch and lumber camp in the great Northwest.
Bookman, 20:219; Nation, 79:420

*b* **Whitney,** *Mrs* **A. D. T.** Biddy's Episodes. Houghton $1.50

4-27869 An ideal old maid tells of a young girl's efforts to lead a sensible, useful life, instead of following her stepmother's round of fashionable dissipation.
Lit. W. 35:379

**Wiggin,** *Mrs* **K. D. (Smith)** (*Mrs* Riggs) *& others.* The Affair at the Inn. Houghton $1.25

4-18896 Love comedy, following chance meeting at Dartmoor inn. Written in first person, each author responsible for one character.
Bookman, 20:374; Spec. 93:903

*b* **Woman** Errant (The); being Some Chapters from the Wonder Book of Barbara, the Commuter's Wife. Macmillan $1.50

4-15365 Barbara's pleas for simple, wholesome living are telling and delightful and a less lurid and more truthful background would have furnished more effective contrast.
Bookman, 20:59; Current Lit. 37:237; Dial, 37:41; Nation, 79:121

**Wright, M. T.** The Test. Scribner $1.50

4-7330 The test is involved in the attitude of parents, grandparents and others toward a child born out of wedlock. Well written, restrained, on high moral plane.
Bookman, 20:58; Dial, 36:370

*a* **Young, R. E.** Henderson. Houghton $1.25

4-3395 The Difficult Minute; The Life on the Table; The Rose-red Glow; The Trail of the Tangler; The Way of the Strong; The Beginning.
Connected stories, all but one previously published in *Atlantic.* Central figure a surgeon of high ideals.
Bookman, 19:299; Lit. W. 35:73

### JUVENILE BOOKS

232.9 *c* **Hodges, George.** When the King Came: Stories from the Four Gospels. Houghton $1.25

4-27362 Tells the Gospel story with fine simplicity. Has been tested by 10 years' home use with children.

372.4 *c* **Grover, E. O.** Art Literature Readers. 9v. v.1, Primer; v.2, Book 1. (Art Lit. Readers) Atkinson 30c ea.

Uncommonly successful child's readers. Each contains about 40 excellent reproductions of paintings, well chosen, generally having strong human interest. The easy text, original or selected, fits the pictures.

372.4 **Wiley, Belle & Edick, G. W.** Lodrix, the Little Lake Dweller. Appleton 30c

4-33223 A little boy's adventure in prehistoric times. Simple language, large type, drawings which illustrate conditions.

**398.2** **Kennedy, H. A.** New World Fairy Book. Dutton $2

5-7732 Mainly Indian legends told by an Indian chief on a northern reservation, to the little son of the English teacher. Well illustrated by drawings.

Spec. 93:771

**398.4** **Williston, T. P.** Japanese Fairy Tales Retold. Rand 75c

The Wonderful Tea-kettle, The Wood-cutter's Saké and six other Japanese folk tales with Japanese colored illustrations.

**550** **Fairbanks, H. W.** Stories of Rocks and Minerals for the Grammar Grades. Educ. Pub. Co. 60c

"Stories" is somewhat misleading. Directly instructive, in simple style. Will assist children in observing earth structure and identifying minerals. Illustrations helpful though rather poorly executed.

**551.48** **Parker, F. W. & Helm, N. L.** A River Journey. (Uncle Robert's Geography) Appleton 60c n

4-16184 Fourth and last of series. During a summer excursion the Leonard boys study earth structure and effects of physical forces.

**599.3** **Morley, M. W.** Little Mitchell: the Story of a Mountain Squirrel. McClurg $1.25

4-10957 About a tame and playful squirrel found when a tiny baby in the North Carolina forests and carried to Boston to live.

599.7 *a* **Carter, M. H.** *ed.* Bear Stories retold from St Nicholas. (Animal Stories) Century 65c n

4-21576 Stories, sketches and verses by W. S. Hornaday, C. F. Holder, Tudor Jenks, Bret Harte, R. E. Peary, E. W. Kemble and others. All of this series interest children, and though the stories are uneven in merit, they average high. Other titles: About Animals; Cat Stories; Lion and Tiger Stories; Panther Stories; Stories of Brave Dogs. 4-21890-94

600 **Lane, M. A. L.** *ed.* Industries of To-day. (Youth's Companion Ser.: The World's Progress Readers) Ginn 40c

4-3366 Cod fishing, ranch life, peanut, cranberry and raisin culture, ice harvesting and manufacture, how matches, pins and fireworks are made, etc.

716 *a* **Duncan, Frances.** Mary's Garden and How It Grew. Century $1.25

4-30612 Gives in simple, clear language the story of a child's labors over her garden from December to November, with enough practical information and illustrations to make it a valuable textbook.

*Nation,* 79:485

4-23694 Miller's illustrated *Children's Gardens for School and Home,* Appleton $1.20, includes flowers, shrubs, trees, soils, pests, etc., and is useful to teachers and parents.

Duncan, Nation, 79:485

790 *c* **Beard, Lina & A. B.** Indoor and Outdoor Handicraft and Recreation for Girls. Scribner $1.60 n

4-28423 Weaving, twine work, basketry, paper flowers, clay-modeling, Easter, May day and Hallowe'en games, parlor magic, finger plays, etc.

799 **Holder, C: F:** The Boy Anglers. Appleton $1.50

4-28221 Fishing adventures in company with an expert angler in California, Canada, Gulf of Mexico, Pacific and Atlantic oceans. Much information about fish, tackle and fishing grounds. Illustrated.

808.8 **Hazard, Bertha,** *comp.* Three Years with the Poets. Houghton 50c n

4-32299 Poems to be memorized by children in grades 1-3. Chosen with recognition of child's interests and capacity; arranged by months.
4-12084 Clear, good-sized type. Miss M. E. Burt in her *Poems that Every Child Should Know,* Doubleday 90c n., sometimes challenges opposition by didactic statements of opinion, but her selection is interesting and valuable for somewhat older children.

818.4 **Gerson, Virginia.** The Happy Heart Family. Fox $1 n

4-24475 Picture story, quite unliterary, but possessing a kind of fancy and unexpectedness in text and illustration which young children like.
Critic, 45:575; Nation, 79:484

916.8 **Bicknell, L. M.** How a Little Girl Went to Africa. Lee $1

4-11220 Journey and experiences of little daughter of American missionary among Zulus, related by herself in simple interesting style.

919 **Carpenter, F. G:** Australia, our Colonies and other Islands of the Sea. (Carpenter's Geog. Reader) Amer. Bk Co. 60c

4-7722 Personally conducts children through chief islands of world giving excellent idea of people and resources. Maps and illustrations.

919.8 *c* **Peary, R. E. & M. A.** (The Snow Baby). Snowland Folk. Stokes $1.20

4-29196 True stories told by Lt. Peary and his little daughter about people and animals of the frozen North. Many photographic illustrations.

JUVENILE BIOGRAPHY

*Beethoven.* **Hoffmann, Franz.** Ludwig Van Beethoven; tr. by G: P. Upton. (Life Stories for Young People) McClurg 60c n

4-31601 Series includes also Hoffmann's *Mozart's Youth,* Henning's *Maid*
4-31600 *of Orleans* and Schmidt's *William Tell.*
4-32320 These narratives have been well calculated for youthful minds past infancy and Mr Upton's version is easy and idiomatic.
*Nation,* 79:334

Dial, 37:381

*b* **McDougall, Isabel.** Little Royalties: Stories about the Children of the Rulers of Europe. Revell $1.25

4-22902 Well founded, biographic stories of Edward 6, Richard 2's child wife, the great Napoleon's little son, Matilda of Germany, empress at 12, the Tower princes and other royal children. Illustrated from paintings.

## JUVENILE FICTION

**Baldwin, *Mrs* A. A.** The Pedlar's Pack. Lippincott $2

The Giant's Baby, Princess Petunia and the Fairy Grimbona, Carl and Carlo, The Youngest Son, and other remarkably well told modern fairy tales.

Acad. 67:559; Sat. R. 98: sup. Dec. 17, p. 7; Spec. 93:874

**Brown, A. B.** The Flower Princess. Houghton $1

4-24500 *Contents:* The Flower Princess; The Little Friend; The Mermaid's Child; The Ten Blowers.

*b* **French, Allen.** The Story of Rolf and the Viking's Bow. Little $1.50

4-24565 Inspired by and in some degree based on the Icelandic sagas. Courage, self-control, patriotism, perseverance, are the qualities developed in the young hero.

*c* **Grinnell, G: B.** Jack in the Rockies. Stokes $1.25

4-26873 Adventures of two boys and an old woodsman with a pack train in Yellowstone Park. Follows *Jack among the Indians.*

**Huntington, H. S.** *pseud.* His Majesty's Sloop *Diamond Rock.* Houghton $1.50

4-28417 Diamond Rock guarded the port of Fort de France, Martinique. Story tells of English defense and final surrender to French fleet.

Nation, 79:527

*c* **Lorenzini, Carlo, "C. Collodi"** *pseud.* The Adventures of Pinocchio. Ginn 60c

4-22857 Capers and wonderful adventures of a wooden marionette; translated from Italian. Well illustrated by Charles Copeland.

Dial, 37:380; Nation, 79:485

*a* **Musset, Paul de.** Mr Wind and Madam Rain. Putnam $2

Fairy tale founded on old Breton legends. Excellent drawings. First published about 1860 and well worth reprinting.

*a* **Pier, A. S.** Boys of St Timothy's. Scribner $1.25 n

4-24578 Football, hockey, baseball, rowing, running, tennis, and debating contests. Independent but connected school stories, making for manliness, vigor and character.

Lit. W. 35:380

**Potter, Beatrix.** The Tailor of Gloucester. Warne 50c

3-26374 Tale of a good little man befriended by talking mice. It echoes so skilfully the manner of the true folk tale as to leave the reader in doubt. 26 charming colored pictures.

Ath. 1903. 2:648

**Quirk, L. W.** Baby Elton, Quarter-back. Century $1.25

4-27672 Story of college athletics, making for manliness and moral courage.

**Rankin, C. W.** Dandelion Cottage. Holt $1.50

4-32150 Four well characterized little girls adopt an abandoned house and fit it up as a playhouse.

*b* **Richards, *Mrs* L. E. (Howe).** The Merryweathers. (Three Margarets and Hildegarde Ser.) Estes $1.25

4-18777 Doings of sons, daughters, cousins and friends at the Merryweather summer camp on a Maine lake.

**Richards, Rosalind.** The Nursery Fire. Little $1.50

4-27867 The Party, The Hammock Ship, The Mumps Circus, The Ogre's Tablecloth and other short stories for younger children.

*c* **Rood, H: E:** In Camp at Bear Pond. Harper $1.25

4-31052 Boys' good times in Pennsylvania mountains. They encounter wild animals and discover Indian remains.

**Taggart, M. A.** The Little Grey House. McClure $1.25

4-25104 Story of three nice girls, their friendships and brave struggle against adverse circumstances.

## COMPARATIVE TABLE OF BOOKS PUBLISHED IN 1904

These statistics are based on lists prepared according to varying classifications and methods. The figures should therefore be regarded as only approximate. See paper on Relative Book Production by Dr E. C. Richardson in *Publisher's Weekly*, 57:805, and abstract in *Public Libraries*, 5:192.

| 1904 | United States | Great Britain | [a]Germany | France |
|---|---|---|---|---|
| Religion and philosophy | 775 | 666 | 3 213 | 978 |
| Sociology | 336 | 775 | [b]4 212 | 875 |
| Law | 614 | 103 | ...... | 479 |
| Education | 628 | [c]836 | [d]4 218 | 1 203 |
| Science, useful arts, fine arts | 916 | 532 | 4 938 | 1 147 |
| Medicine and hygiene | 278 | 219 | 1 989 | 1 206 |
| Literature | 762 | 220 | [ce]5 682 | 664 |
| Poetry and drama | 538 | 407 | ...... | [f]808 |
| Fiction and juvenile | 2 240 | 2 548 | ...... | 588 |
| History, biography, travel | 1 034 | 942 | 2 548 | 1 450 |
| Miscellaneous | 170 | 1 086 | 1 578 | 78 |
| Total | 8 291 | 8 334 | 28 378 | 9 476 |

[a] Includes pamphlets and leaflets issued by universities. [b] Includes law. [c] Includes philology. [d] Includes juvenile. [e] Includes drama and fiction. [f] Includes theater.

# AUTHOR'S INDEX

**The superior figures tell the exact place on the page in ninths: e. g. 523$^3$ means page 523, beginning in the third ninth of the page, i. e. about one third of the way down.**

**A. L. A.** Catalog, 505$^1$
Adams. A Texas Matchmaker, 528$^5$
Adventures of Elizabeth in Rügen, 520$^8$
Airy. Charles 2, 525$^7$
Aldrich, Richard. Guide to Parsifal, 515$^6$
Aldrich, T: B. Judith of Bethulia, 516$^9$
Altmaier. Commercial Correspondence and Postal Information, 513$^2$
Asakawa. The Russo-Japanese Conflict, 523$^8$

**Baldry.** Holbein, 514$^7$
Baldwin. The Pedlar's Pack, 536$^2$
Bancroft. Letters from England, 525$^8$
Barbour. Book of School and College Sports, 516$^2$
Barritt. How to Draw, 514$^8$
Barry. Newman, 527$^8$
Barton. Story of the Red Cross, 508$^6$
Bateson. Mediaeval England, 523$^5$
Beard. Indoor and Outdoor Handicraft and Recreation for Girls, 535$^1$
Besant. London in the Time of the Tudors, 520$^2$
Bicknell. How a Little Girl Went to Africa, 535$^5$
Bond and Hopkins. Scientific American Reference Book, 505$^3$
Bradley. Canada in 20th Century, 522$^1$
Brandenburg. Imported Americans, 506$^8$
Briggs. Routine and Ideals, 508$^9$
Brown, A. B. The Flower Princess, 536$^8$
Brown, K. H. Diane, 528$^6$
Brownell. Photography for the Sportsman Naturalist, 515$^8$
Buckley. Sir Edward Elgar, 526$^8$
Burdick. The Mystic Mid-region, 523$^2$
Burne-Jones, G. *lady*. Memorials of Edward Burne-Jones, 525$^6$
Burroughs. Far and Near, 517$^9$

**Caffin.** American Masters of Sculpture, 514$^6$
Carey and Wimbush. The Channel Islands, 523$^7$
Carpenter. Australia, 535$^6$
Carter. Bear Stories retold from St Nicholas, 534$^6$
Child. English and Scottish Popular Ballads, 516$^5$
Churchill. The Crossing, 528$^7$
Cleveland. Presidential Problems, 508$^3$
Cochrane. Modern Industrial Progress, 512$^2$
Colby. Imaginery Obligations, 518$^1$
Collodi, C. *pseud., see* Lorenzini
Colquhoun. Greater America, 524$^2$
Compton. Indian Life in Town and Country, 521$^9$
Comstock, J: H: & A. B. How to Know the Butterflies, 511$^4$
Connor, Ralph, *pseud., see* Gordon
Conrad, Joseph & Hueffer. Romance, 528$^6$
Conrad, Stephen, *pseud.* The Second Mrs Jim, 528$^9$
Conway. Autobiography, 526$^1$
Cooper & Maurice. History of the 19th Century in Caricature, 523$^3$
Crawford. The College Girl of America, 509$^6$

**Daskam.** Memoirs of a Baby, 529$^1$
Davidson. Education of the Wage-earners, 509$^4$
Davis. Bits of Gossip, 518$^8$

Dawson. Matthew Arnold, 525$^{1}$
Deland. The Common Way, 518$^{2}$
Devine. Principles of Relief, 508$^{6}$
Doubleday. Stories of Inventors, 512$^{1}$
Dougall. The Burns Country, 519$^{7}$
Dowden. Robert Browning, 525$^{5}$
Duncan, Frances. Mary's Garden and How It Grew, 534$^{8}$
Duncan, Norman. Doctor Luke of the Labrador, 529$^{2}$

Edick & Wiley. Lodrix, 533$^{9}$
Elliott. Roma Beata, 520$^{8}$
Elson. History of American Music, 515$^{6}$

Fairbanks. Stories of Rocks and Minerals, 534$^{3}$
Fiske. The Modern Bank, 507$^{3}$
French. Story of Rolf and the Viking's Bow, 536$^{4}$
Froehlich & Snow. Text-books of Art Education, 513$^{6}$

Ganz. The Land of Riddles, 520$^{9}$
Garnett. Turkish Life in Town and Country, 521$^{2}$
Gerson. Happy Heart Family, 535$^{4}$
Glasgow. The Deliverance, 529$^{3}$
Goldenberg. Lace, 514$^{9}$
Goodnow. City Government in the United States, 508$^{2}$
Gordon. The Prospector, 529$^{4}$
Granger. Index to Poetry and Recitations, 505$^{6}$
Grant. The Undercurrent, 529$^{5}$
Grinnell. Jack in the Rockies, 536$^{8}$
Gronau. Titian and his School, 528$^{3}$
Grove. Dictionary of Music and Musicians, 505$^{5}$
Grover. Art Literature Readers, 533$^{8}$

Hamilton. Korea, 521$^{6}$
Harland. My Friend Prospero, 529$^{6}$
Hart. The American Nation, 524$^{8}$
Hawkins. Double Harness, 529$^{7}$
Hayes, Henry, *pseud.*, *see* Kirk
Hazard. Three Years with the Poets, 535$^{3}$
Helm & Parker. A River Journey, 534$^{4}$
Henderson. Modern Methods of Charity, 508$^{4}$
Herford. Rubáiyát of a Persian Kitten, 519$^{3}$
Herrick, C. A. Meaning and Practice of Commercial Education, 512$^{8}$
Herrick, Robert. The Common Lot, 529$^{9}$
Hewlett. The Queen's Quair, 530$^{2}$
Hodges. When the King Came, 533$^{7}$
Hoffmann, Prof. *pseud.*, *see* Lewis
Hoffmann, Franz. Ludwig Van Beethoven, 535$^{6}$
Hoffmann, Ralph. Guide to the Birds of New England and Eastern New York, 511$^{5}$
Holder. Boy Anglers, 535$^{2}$
Hope, Anthony, *pseud.*, *see* Hawkins
Hopkins & Bond. Scientific American Reference Book, 505$^{3}$
Hornaday. American Natural History, 511$^{3}$
Hosie. Manchuria, 521$^{4}$
Housman. Sabrina Warham, 530$^{3}$
Howells. Son of Royal Langbrith, 530$^{4}$
Hueffer & Conrad. Romance, 528$^{6}$
Hunt. Cereals in America, 512$^{5}$
Hunter. Poverty, 507$^{7}$
Huntington, H. S. *pseud.* His Majesty's Sloop *Diamond Rock*, 536$^{5}$

Jespersen. How to Teach a Foreign Language, 509$^{9}$-10$^{1}$
Johnson. Highways and Byways of the South, 522$^{6}$
Jordan, Elizabeth. May Iverson—her Book, 530$^{5}$
Jordan, M. A. Correct Writing and Speaking, 517$^{4}$

Kean, Martha, *pseud.* A Transplanted Nursey, 520$^{7}$
Kellor. Out of Work, 507$^{2}$
Kelly. Little Citizens, 530$^{6}$
Kennedy. New World Fairy Book, 534$^{1}$
Ker. The Dark Ages, 517$^{7}$

Steps of Honor, 530$^{7}$
nd. Book of Indoor and Out-
Games, 515$^{6}$
Traffics and Discoveries,

pology of Ayliffe, 530$^{9}$
Japanese Life in Town and
ry, 521$^{8}$

M. Nancy Stair, 531$^{1}$
A. L. Industries of To-day,

Pathfinders of the West, 526$^{5}$
Maria Edgeworth, 526$^{3}$
& Scales. Argumentation
ebate, 517$^{5}$
E. Recollections and Letters,

dney. Great Englishmen of
th Century, 526$^{8}$
The Man Roosevelt, 527$^{5}$
Later Magic, 516$^{1}$
Cap'n Eri, 531$^{3}$
Soldier of the Valley, 531$^{6}$
i. Adventures of Pinocchio,

Old Gorgon Graham, 509$^{5}$
ry. Standard of Pronunci-
n English, 510$^{3}$
rench Home Cooking, 512$^{6}$
idney, *pseud.*, *see* Harland

n. Marjorie Fleming, 526$^{4}$
y. An Irishman's Story, 526$^{9}$
n. Historic Dress in Ameri-

ll. Christ, 506$^{1}$
en. Women of America,

all. Little Royalties, 536$^{1}$
d. Getting acquainted with
ees, 510$^{8}$
ck. The Double Garden,

: S. The Luxury of Child-
9$^{6}$
H. R. Tillie: a Mennonite
31$^{4}$
Field Book of Wild Birds,

Maurice & Cooper. History of the 19th Century in Caricature, 523$^{6}$
Maxwell. The Log of the *Griffin*, 519$^{6}$
Michelson. In the Bishop's Carriage, 531$^{5}$
Mitchell, J: A. Villa Claudia, 531$^{6}$
Mitchell, S. W. The Youth of Washington, 531$^{7}$
Montague. Trusts of To-day, 507$^{4}$
Morley. Little Mitchell, 534$^{5}$
Munro. Source Book of Roman History, 523$^{4}$
Münsterberg. The Americans, 522$^{8}$
Murphy. Problems of the Present South, 522$^{7}$
Musset. Mr Wind and Madam Rain, 536$^{7}$

**Niles.** Bog-trotting for Orchids, 510$^{9}$

**O'Connor.** Heroes of the Storm, 519$^{4}$
Ogden. William Hickling Prescott, 527$^{4}$
Okakura Kakuzo. Awakening of Japan, 523$^{9}$

**Page,** C. H. British Poets of the Nineteenth Century, 516$^{6}$
Page, T: N. The Negro, 506$^{6}$
Paine. Thomas Nast, 527$^{3}$
Parker & Helm. A River Journey, 534$^{4}$
Pauli. Venice, 514$^{1}$
Payne. American Literary Criticism, 517$^{3}$
Peary. Snowland Folk, 535$^{7}$
Peloubet. Front Line of the Sunday-school Movement, 506$^{3}$
Perry. The Amateur Spirit, 518$^{8}$
Pertwee. Reciter's Treasury of Verse, 516$^{3}$
Peters. Early Hebrew Story, 505$^{9}$
Phillips. The Sin of David, 517$^{1}$
Pickard. Whittier-land, 522$^{5}$
Pier. Boys of St Timothy's, 536$^{8}$
Platner. Topography and Monuments of Ancient Rome, 519$^{5}$

Potter, Beatrix. Tailor of Gloucester, $536^9$
Potter, M. K. Art of the Louvre, $513^8$
Powell. The Country Home, $512^4$
Pryor. Reminiscences of Peace and War, $524^7$

**Quirk.** Baby Elton, Quarter-Back, $537^1$

**Raimond,** C. E. *pseud., see* Robins
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Published monthly by the
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September [illegible]

# Higher Education

Bulletin 25

# Syllabus and Course of Study

FOR THE

COLLEGE GRADUATE PROFESSIONAL CERTIFICATE

AND FOR THE

RENEWAL OF THE COLLEGE GRADUATE CERTIFICATE
LIMITED

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# Higher Education

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**Bulletin 25**

# Course of Study and Syllabus

FOR THE

**COLLEGE GRADUATE PROFESSIONAL CERTIFICATE**

AND FOR

**RENEWAL OF THE COLLEGE GRADUATE CERTIFICATE LIMITED**

prepared for the

EDUCATION DEPARTMENT

Under the advice and cooperation of the following committee appointed at a conference of the colleges and universities of the State

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Augustus S. Downing M.A.
Third Assistant Commissioner of Education

**September 1, 1905**

# COURSE OF STUDY AND SYLLABUS

FOR THE

# COLLEGE GRADUATE PROFESSIONAL CERTIFICATE

The course of study herein set forth is prescribed under authority of special statute for teachers training departments in colleges and universities, and the successful completion of the course entitles a student to the college graduate professional certificate. The course is based upon the condition that the student shall be in good and regular standing for the B. A., B. S. or Ph. B. degree.

The syllabus is made to assist students in meeting the requirements for two grades of certificates:

1 **College graduate professional certificate.**

This certificate can be obtained only on successful completion of the approved course of study in a college or university. It is valid for three years in any school in the State, so far as State laws are involved, and is renewable for life if the applicant can furnish evidence, satisfactory to the Commissioner of Education, of success in teaching.

2 **Renewal of the college graduate certificate, limited.**

Under the regulations established by this Department Dec. 1, 1904, it is provided that "a certificate, valid for two years, will be granted to a graduate of any approved college. If during this term the holder shall pass an examination on the theory and practice of teaching, based on the syllabus prepared on the four general topics given on page 403, the certificate will be renewed for one year. At the end of three years successful experience in teaching a college graduate certificate will be issued, valid for life."

The course of reading in the principles of teaching recommended as a preparation for the above mentioned examination is included in the syllabus under the heading "Books for study."

**Conditions to be met and requirements to be accepted by colleges and universities as a prerequisite to the approval of the teachers training course.**

1 Certification by the board of trustees to the Commissioner of Education of the establishment of a regular chair of pedagogy.

2 Formal adoption by the board of trustees of the professional course of study approved by the State Commissioner of Education, and formal acceptance of the conditions and requirements.

A copy of this action, duly attested, must be filed with the Commissioner of Education. It is understood that the course prescribed is a minimum course and may be extended by the board of trustees.

3 Filing with the Commissioner of Education at the beginning of each year a list of the students registered for this course, and at the close of the year a report of the year's work, with recommendation of students entitled to the professional certificate.

4 Inspection by the Commissioner of Education, which inspection shall include such examinations, preliminary, final, or in course, as may be prescribed to test the character of instruction and capacity of the student.

5 Pursuance of the approved course of study during the last two years of the college course.

### Course of study

The minimum course of study approved by the State Commissioner of Education for the training of teachers in colleges and universities must include the following subjects, and to satisfy the requirements of the statute the course must extend over a period of at least 38 weeks.

| | |
|---|---|
| Psychology—general and educational | 90 hours |
| History of education and<br>Principles of education | 90 hours |
| Method in teaching | 60 hours |
| Observation | 20 hours |

For the elaboration of these courses, the special subjects to be treated under each, the books for study and books of reference recommended, attention is directed to the following syllabus.

To any candidate who meets the prescribed conditions will be issued a certificate upon receipt of a statement from the proper college authority certifying that he is entitled to the degree of B.A., Ph.B. or B.S., that he is of good moral character, and is worthy to be employed in the public schools of the State.

The certificate is termed the **college graduate professional certificate** and is valid for a period of three years. If the work proves satisfactory during this period the certificate will be made permanent.

# SYLLABUS

ON

**a Psychology: general and educational**
**b History of education**
**c Principles of education**
**d Method in teaching**

TO ACCOMPANY A COURSE OF READING FOR RENEWAL OF THE COLLEGE
GRADUATE CERTIFICATE LIMITED, AND TO FORM A BASIS
FOR THE TRAINING OF TEACHERS IN COLLEGES
AND UNIVERSITIES

## PSYCHOLOGY GENERAL AND EDUCATIONAL

In preparing this outline on psychology announcement is clearly given that it is made from the standpoint of the college graduate who is to pursue a course of general reading and study in the subject, and not from the standpoint of the college classroom. It could not be constructed on the latter basis unless a separate syllabus were issued for each university course. The references are therefore general and based upon a broad consideration of the subject, and the terminology is not dependent upon any special system or textbook. The syllabus has been constructed upon the advice of many eminent psychologists and can easily be made the basis of classroom instruction, subject to such modifications in the order, and in the extent, as the individual teacher may desire.

In pursuing a course in reading the student should not concern himself with the abstract facts and still less with the unsolved problems of the subject, but should strive to gain an intelligent grasp of the mind and appreciate its relation to education in order that efficient ways and means may be discovered for facilitating mental growth. For this purpose it is believed that intensive rather than extensive study will serve best, and therefore the candidate will be required to show on examination that he has mastered the following works:

### Books for study

Titchener. Outlines of Psychology. (Macmillan)
James. Principles of Psychology. v. 1 and 2: ch. 2, 4, 9, 11, 12, 14, 16, 17, 18, 22-26. (Holt)
Welton. The Logical Basis of Education. (Macmillan)
Kirkpatrick. The Fundamentals of Childstudy. (Macmillan)

Dexter and Garlick. Psychology in the Schoolroom. (Longmans)
or
James. Talks to Teachers. (Holt)

Connected with the outline of each topic will be found a bibliography, ***which is suggestive and not required,*** for those students who may wish to make a more extended study of the subjects. Foreign and magazine references are in the main omitted.

## Outline

### 1 Physical basis of mind

Mind and matter, their heterogeneity, their interaction; the nervous system; sensory and motor arc, reflex and automatic action; Hughlings Jackson's three level theory; relation of mind growth and decay to body growth and decay; physical differences between the child and the adult; significant physiological changes that occur as the accompaniment of growth; nature, laws of growth; the senses, their physiology and defects, and modes of determining their condition; localization of cerebral functions; health and ability; the school and health.

*References*

Martin. Human Body. (Holt)
McKendrick and Snodgrass. Physiology of the Senses. (Scribner)
Bastian. The Brain as an Organ of Mind. (Appleton)
Donaldson. The Growth of the Brain. (Scribner)
Hack Tuke. The Influence of Mind upon Body. (L. Churchill)
Simpson. How the Body Affects the Mind. (Manchester and Salford Sanitary Association 1878)
Ferrier. Functions of the Brain. (Putnam)
Oppenheim. Mental Growth and Control. (Macmillan)

### 2 Original nature or inborn tendencies

Instincts and capacities the foundation for education; useful and harmful instincts and capacities; their development through practice and through rewarding their exercise by pleasure; their inhibition by repression, by substitution, by disuse; the advantage of the exercise of any capacity at its inception; the futility of teaching what will come of itself as a delayed instinct; curiosity, constructiveness, love of achievement, emulation and other instincts important in school work; observation, memory, quickness, abstract thinking, self-control and other capacities important in school work; the instincts and capacities specially concerned in secondary education; individual differences in original nature; sex differences in original nature.

*References*

*Ribot.* Psychology of the Emotions. (Scribner)
*Darwin.* Origin of Species. (Appleton)

**Morgan. Habit and Instinct. (Longmans)**
**Romanes. Mental Evolution of Animals. (Appleton)**
**Hobhouse. Mind in Evolution. (Macmillan)**

### 3 Sensation

Its nature, physical basis, classification, relation to the cognitive process.

### 4 Perception

Nature; physical basis; factors involved in perception; its product; its part in cognition; type of ideas it gives, perception and education.

*References*

Sully. Human Mind. (Appleton)
James. Principles of Psychology, ch. 15, 19, 20, 21. (Holt)

### 5 Attention

Definition; conditioning elements, physical and psychical elements involved, kinds and classification, results; cause of mental diffusion; how to secure attention, child and adult attention; abnormal states of attention; pedagogic implications.

*References*

Ribot. Psychology of Attention. (Open Court)
Fitch. Lectures on Teaching. (Bardeen)
—— Art of Securing Attention. (Bardeen)
Külpe. Outlines of Psychology. (Macmillan)
Hinsdale. Art of Study. (Amer. Book Co.)

### 6 Memory

Nature and importance, relation to intellectual growth, physical basis, elements involved, conditions of recollection; association of ideas, and its laws, kinds; recognition and retention; child versus adult memory; conditions needful for a good memory; how the memory is weakened or destroyed; pedagogical applications.

*References*

Kay. Memory, What it is and How to Improve it. (Appleton)
Ribot. Diseases of Memory. (Appleton)
Colgrove. Memory. (Holt)
Sully. Human Mind, ch. ix. (Appleton)

### 7 Imagination

Its nature and importance; its relation to memory; childhood and adult characteristics; its imitative nature; kinds of imagination; rôle in play and games; its function in intellectual, scientific, esthetic and moral growth; methods of developing the *imagination; specific* material.

*References*

School Review, Dec. 1898, p. 692–724
Halleck. Education of the Central Nervous System. (Macmillan)
Galton. Inquiries into Human Faculty. (Macmillan 1883)
Huston, C. Howard. The Education of the Imagination.
Bryan. Eye and Ear Mindedness. Int. Cong. Education. Proc. 1893
Sully. Human Mind, ch. x. (Appleton)

### 8 Conception

**Nature, how formed; the processes involved; the concept and classification; the concept and thought; growth of conceptual power; the concept as the goal of instruction; content and extent of concept; language.**

### 9 Apperception

**Its nature and conditions, relation to association of ideas, to mental growth, to illusions, to misinterpretations, its application to the arrangement of a course in any subject; to the development of a topic as a whole; to the individual lesson; to reviews; the application of its corollary, "Put together only what you wish to go together in the student's mind"; to teaching the forms in foreign languages; to the question of definitions and rules versus types and concrete illustrations; to oral versus written** spelling; apperception and observation; apperception and inference; apperception and inductive methods of teaching.

*References*

Lange. Apperception. (Heath)
Rooper. Apperception. (Bardeen)
DuBois. The Point of Contact. (Dodd)
Pillsbury. Am. Journal Psychology, v. viii, 315–93

### 10 Judgment and reasoning

Nature of logic; nature of judgment; abstract nature of thought; function and value of logic; judgment and proposition; judgment and truth; judgment and experience; terms and their classification; proposition and its elements; types of judgment; negation.

Inference

Its nature; what it implies concerning our experience; method and inference; inference and system; deductive and inductive inference; analysis and synthesis.

Deduction

Kinds and their values; subsumption and substitution; syllogism and its laws and forms, dilemmas and fallacies.

### Induction

Its nature and presuppositions, method of induction, canons of induction, fallacies of induction.

Testimony, hypothesis, definition, classification and explanation.

Relation of logic to educational theory, relation to method; the training of the logical faculties in (*a*) the primary school, (*b*) the grammar school, (*c*) the high school.

*References*

Binet. Psychology of Reasoning. (Open Court)
Harris. The Psychologic Foundations of Education. (Appleton)
Dewey. Studies in Logical Theory. (Univ. of Chicago Press)
Ravenshear. Testimony and Authority. Mind, n. s. 7:63
Sully. Teachers' Handbook of Psychology. (Appleton)

### 11 Feeling and emotions

Nature; relation to knowledge; theory of the emotions; classification; attributes of the emotions, factors determining their rise or decline; their function in the teaching process; method and means for their cultivation.

*Reference*

Ribot. Psychology of the Emotions. (Scribner)

### 12 Interest

Its emotional character; kinds; means of arousal; relation to attention, to memory, to will; growth and interest; repetition and interest; causes in the school which tend to deaden interest; means of securing it; permanent interest as an end of instruction; personal interests of children; interest as the basis of instruction.

*References*

Ostermann. Interest. (Kellogg)
Adams. Herbartian Psychology Applied to Education, ch. 10. (Heath)
Dewey. Interest as Related to Will. Herbart Soc. Year Book. 1895

### 13 Habit

Its nature; physical basis; psychological element; laws of habit; practical significance; relation of habit and intellectual power, habit and will; habit and conduct; habits of observation, caution etc.; the important general habits of school life; routine and originality; the relation of drill to intellectual progress; the relation of habitual responses to character; the importance of the initial steps in new subjects, with special reference to the habits of inference rather than memory in geometry, of thinking of foreign words in their own, not in their Anglicized sounds, of experiment and observation in science courses, and of the attitude of appreciation in courses in literature.

*References*

Radestock. Habit in Education. (Heath)
Holmes. Mechanism in Thought and Morals. (Houghton Mifflin)
Andrews. Am. Journal Psychology, v. xiv, p. 121–49

### 14 Will

Definition; its genesis from the involuntary; motives and will, inhibition and will, attention and will, habit and will, impulse and will; volition and perseverance; ideomotor life; will and emotional control; development of the will; types of volitional life; diseases of the will; education of the will; will in education.

*References*

Ribot. Diseases of the Will. (Open Court)
Bain. Emotions and Will. (Appleton)
Dexter and Garlick. Psychology in the Schoolroom, ch. 21. (Longmans)
Dewey. Interest as Related to Will. Herbart Soc. Year Book. 1895

### 15 Character

Definition; character and conduct, character and habit, character and feeling, character and intellect, character and will, character and ideals; physiology and psychology of character; heredity and environment and character; temperament and its varieties and character; mechanism in conduct and morals; diseases of personality; influence of school subjects upon morals; the "school city" as a means of moral training; interests and morals; athletics and morals; suggestive versus moral dogmatic teaching.

*References*

Ribot. Diseases of Personality. (Open Court)
Dexter and Garlick. Psychology in the Schoolroom, ch. 22. (Longmans)
Small. Suggestibility of Children. Ped. Sem. v. 4
Stewart. Our Temperaments. (Lockwood)

### 16 Development of motor ability

Physical basis of movement; forms of movement as impulsive, instinctive, imitative, involuntary, voluntary, reflex, sensory, ideomotor; coordination, suggestion and action; knowledge becomes clearer, more emphatic and more permanent when expressed in movement; the value of drawing, painting, modeling, constructive work and the like; their limitations; motor expression through construction versus expression in spoken or written words; forms of expression of thought compared with respect to accuracy, clearness, vividness, surety of real as opposed to memoriter knowledge; with respect to convenience, economy of time and capacity to express abstract ideas; the desirability of util-

**izing in secondary education the constructive interest and the superior clearness and vividness of modes of expression other than in words; graphic constructions in algebra; paper folding in geometry; model making in physics; diagrams, map drawing and illustrating in history; the presentation of plays in language and literature courses, etc.; the richness of the means of expression known to psychology and utilized in life compared with the poverty of present methods in secondary education.**

*References*

Bryan. Development of Voluntary and Motor Ability. Am. Journal Psychology (5: 125-204)
Halleck. Education of the Central Nervous System. (Macmillan)
Hancock. Study of Motor Ability. Ped. Sem. 3: 9-29
Dopp. The Place of Industries in Elementary Education. (Univ. of Chicago Press)
Dewey. School and Society, ch. 1 and 2. (McClure)
Burk. Ped. Sem. v. vi, p. 5-64

### 17 Curiosity, suggestion and imitation

Their instinctive nature, significance for character, their potency in normal children, their capricious nature; rise and decline of interests; relation of curiosity to material and methods of instruction; complemental nature of suggestion and imitation; suggestion in the economic, social, intellectual and ethical realm; the universality of suggestibility; moral and vicious suggestive agencies; imitation as the method of childhood, things imitated; kinds; imitation and personality; relation to maturity of pupils; to the type of individual student; illustrations of their efficient use in intellectual education; in moral education; the application of the psychology of imitation and suggestion to the development of appreciation of the various forms of art; to teaching manners, as the principle of school discipline; the moral value of cooperative study and mutual helpfulness.

*References*

Royce. Cent. Mag. May 1894, p. 202-22, 325-31, 449-63
Sidis. Psychology of Suggestion. (Appleton)
Quackenbos. Hypnotism in Mental and Moral Culture. (Harper)
Steel. Imitation; or, The Mimetic Force in Nature and Human Nature. (Simpkin)
Small. The Suggestibility of Children. Ped. Sem. v. 4.
Frear. Imitation. Ped. Sem. v. 4
Gross. The Play of Man. (Appleton)

### 18 Heredity and environment

Heredity defined, the laws of heredity, the factors of heredity, the gifts of heredity, the limitations of heredity, heredity and psychical and moral powers, heredity and race degeneracy. An analysis of environmental influences from the psychological point of view; the method of action of the environment—by stimulating to healthy growth, by arousing desirable tendencies, by the elimination of unfit tendencies; hygiene, opportunity for self-activity and incentives and deterrents as the three chief problems of the control of environmental influences; what may properly be expected from the elementary school subjects; from the high school subjects; from school patriotism; from the personal example of the teacher; from cooperation with libraries; with museums; with philanthropic organizations; with the medical profession; with the home; the limitations to environmental influence; the inadequacy of educational equipment.

*References*

**Bradford. Heredity and Christian Problems. (Macmillan)**
**Dugdale. The Jukes. (Putnam)**
**Winship. The Edwards. (R. L. Myers)**
Riddell. Heredity and Pre-natal Culture. (Child of Light Pub. Co.)
Galton. Natural Inheritance. (Macmillan)
Howells. American Text Book of Physiology. (Saunders)

### 19 Adolescence

Period of life, physical changes; growth and adolescence, awkwardness, vitality of the period, pathological possibilities; brain changes, psychical peculiarities, passions, mental mutations; interests, ideals, activities, criminal and ethical tendencies; dangers of the period; pedagogy of adolescence.

*References*

Hall. Adolescence. (Appleton)
Lancaster. Psychology and Pedagogy of Adolescence. Ped. Sem. v. 5
Street. Adolescence. Jour. of Pedagogy, v. 15, no. 1, 2
Burnham. Ped. Sem. 1 : 174–95

### 20 Special studies

Fatigue and its relation to school work and teaching; the psychology of instruction, reading, writing, etc.; child study, its aims, methods and results, the psychologic basis of a course of study; abnormal children and their education; comparative psychology and its problems.

### *References*

Thorndike. Notes on Childstudy. (Macmillan)
King. The Psychology of Child Development. (Univ. of Chicago Press)
Sully. Studies of Childhood. (Appleton)
Wilson. Bibliography of Child Study (will furnish abundant and very specific references for special studies). (Stechert)
Barr. Mental Defectives. (Blakiston)
Moss. Fatigue. (Putnam)
Binet et Henri. La fatigue intellectuelle
Shaw. School Hygiene. (Macmillan)

## B

## HISTORY OF EDUCATION

### Introductory note

The following outline is based upon the unity of the educational process with the wider social process. The syllabus recognizes the relations between educational theory and the wider philosophical and social theory. The history of education reveals to the student the continuity of educational tradition. **The syllabus presents the history of education as a study of problems and tendencies rather than of individuals. Throughout the syllabus the outlines and references are intended to be suggestive merely; they are not intended to be exhaustive in any direction whatever. While certain required textbooks are indicated, it is expected that use will be made of the references upon the several topics.**

### Books for study

**I General:**

**Davidson. A History of Education. (Scribner)**

**Monroe. A Text-book in the History of Education. (Macmillan)**

Painter. A History of Education. (Appleton)

Any one of the above may be selected.

II Special:

1 Greek life and education
  - Davidson. Education of the Greek People. (Appleton)
  - Laurie. Pre-Christian Education. (Longmans)

2 Humanism and science in education
  - Woodward. Vittorino da Feltre and other Humanist Educators. (Macmillan)
  - Laurie. John Amos Comenius. (Bardeen)

3 Education according to nature
  - Davidson. Rousseau and Education according to Nature. (Scribner)

4 Development of modern educational theory
  - Pinloche. Pestalozzi and the Modern Elementary School. (Scribner)
  - De Garmo. Herbart and the Herbartians. (Scribner)

Bowen. Froebel and Education through Self-activity. (Scribner)
Quick. Educational Reformers. (Appleton)

Any one book may be selected under each subdivision except under (4) where two are required.

## Outline

### 1 The evolution of education in primitive society

Education in relation to civilization. The history of education and universal history. The history of education and historical perspective. Education through the experiences of life. The transmission of experiences in primitive society. Methods of social control. Institutions as the embodiment of customs and ideals. The basis and beginnings of instruction in the family. The domination of institutions in primitive society.

*References*

Laurie. Pre-Christian Education. (Longmans)
Lubbock. The Origin of Civilization. (Appleton)
Spencer. Principles of Sociology. (Appleton)
Starr. Some First Steps in Human Progress. (Chautauqua Assembly)
Tylor. Primitive Culture. (Holt)

### 2 Oriental education

Education in relation to the national ideal. Conservation of the social order and customs. Chinese education as typical. Characteristics of the Chinese social system. Education for civil service. Organization of the examination system. Political and social results.

*References*

Laurie. Pre-Christian Education. (Longmans)
Legge. "The Chinese Classics," in The Sacred Books of the East. (Kegan Paul)
Martin. The Chinese. (Harper)
Taylor. Ancient Ideals. (Macmillan)
Williams. The Middle Kingdom. (Scribner)

### 3 Greek life and education

Contrast between eastern and western civilizations in respect to educational ideals and methods. The subordination and repression of the individual versus the liberation and development of personality. The Greek principle of life. Greek religion, art and the national games. Art and science. Aims in old Greek education. Greek education in relation to Greek social organization. Sparta and Athens as types. The organization of the *Athenian schools.* Music and gymnastics. Tendency to individ-

**ualism in Greek life and education.** The new Greek education. **The Sophists. Socrates, Plato an**d Aristotle. Philosophical **schools and their permanent signifi**cance. Significance of the **Alexandrian period. Education as** the essence of Greek life. **Emergence of the ideal of a liberal e**ducation.

*References*

**Aristotle. Politics. (Macmillan).**
**Bosanquet. Education of the Young in Plato's Republic. (Macmillan)**
**Burnet. Aristotle on Education. (Camb. Univ. Press)**
**Butcher, Some Aspects of the Greek Genius. (Macmillan)**
**Capes. University Life in Ancient Athens. (Harper)**
**De Coulange. The Ancient City. (Lee)**
**Davidson. Aristotle and the Ancient Educational Ideals. (Scribner)**
**Mahaffy. Greek Life and Thought. (Macmillan)**
**———. Old Greek Education (Harper)**
**Monroe. Source Book. (Macmillan)**
**Nettleship. "Theory of Education in Plato's Republic," in Abbott's Hellenica. (Longmans)**
**Pater. Plato and Platonism. (Macmillan)**
**Plato. Republic. (Macmillan)**
**Taylor. Ancient Ideals. (Macmillan)**
**Wilkins. National Education in Greece. (Isbister 1873)**
Xenophon. Memorabilia. (Macmillan)

### 4 Ideals and methods of Roman education

Comparison of the Roman national ideal with that of Greece. Ideals of Roman education as expressed in Roman social organization. Roman education and the characteristic Roman virtues. Conception of the practical value of education. Periods of Roman education. Hellenic influence. Organization of the Roman schools. The Roman *Humanitas*. Educational theorists, Cicero and Quintilian.

*References*

Cicero. On Oratory
Clarke. The Education of Children at Rome. (Macmillan)
Dill. Roman Society in the Last Century of the Western Empire. (Macmillan)
Hobhouse. Ancient Education. (Simpkin 1885)
Mahaffy. The Greek World Under Roman Sway. (Macmillan)
Mommsen. History of Rome. (Scribner)
Monroe. Source Book. (Macmillan)
Quintilian. Institutes of Oratory. (Macmillan)
Taylor. Ancient Ideals. (Macmillan)

### 5 Education in the Middle Ages

Influence of Christianity on the progress of education. Contrasts between the classic and the medieval ideal of character. Abandonment of Greek and Roman principles of life and education. Rise of the Christian schools. The education of the cloister and the castle: monasticism and chivalry. The liberal arts. Mysticism. Life in the Middle Ages. The church as the instrument of education.

*References*

Azarias. Essays Educational. (McBride)
Drane. Christian Schools and Scholars. (Burns and Oates 1881)
Hatch. Influence of Greek Ideas on the Christian Church. (Scribner)
Laurie. Rise and Early Constitution of the Universities. (Appleton)
Lecky. History of European Morals. (Appleton)
Mullinger. Schools of Charles the Great. (Longmans)
Poole. Illustration of the History of Mediaeval Thought. (Williams and Norgate)
Taylor. Classical Heritage of the Middle Ages. (Macmillan)
West. Alcuin and the Rise of the Christian Schools. (Scribner)

### 6 Scholasticism and the rise of the universities

Education as an intellectual discipline. Aims and methods of scholasticism. Greek philosophy in the service of the Church. Educational significance and value of scholasticism. Origin and growth of the universities. Their social and intellectual organization. Their influence in European civilization.

*References*

Compayré. Abelard. (Scribner)
Drane. Christian Schools and Scholars. (Burns and Oates)
Draper. History of the Intellectual Development of Europe. (Harper)
Adams. Civilization in the Middle Ages. (Scribner)
Laurie. Rise and Early Constitution of the Universities. (Appleton)
Newman. Historical Sketches. (Longmans)
Rise and Progress of Universities in his Historical Sketches. 1872. 1: 1–251, 313–35
Paulsen. Character and Development of Universities of Germany. (Macmillan)
Rashdall. The Universities of Europe in the Middle Ages. (Oxford)
Townsend. Great Schoolmen of the Middle Ages. (Hodder and Stoughton)

### 7 The Renaissance and the rise of Humanism in Europe

The significance of the Renaissance for modern civilization. Its direct educational bearings. The humanistic conception of education. Da Feltra, Erasmus, Colet, Ascham, Melanchthon, Sturm. The relation of humanism to realism.

*References*

Burckhardt. The Renaissance in Italy. (Sonnenschein)
Emerton. Desiderius Erasmus of Rotterdam. (Putnam)
Hallam. The Middle Ages. (Scribner)
Jebb. Humanism in Education. (Macmillan)
Monroe. Thomas Platter and the Educational Renaissance of the Sixteenth Century. (Appleton)
Pater. The Renaissance. (Macmillan)
Quick. Educational Reformers. (Appleton)
Russell. German Higher Schools. (Longmans)
Seebohm. The Oxford Reformers. (Longmans)
Symonds. The Renaissance. (Holt)
Woodward. Vittorino da Feltre. (Macmillan)
Woodward. Erasmus concerning Education. (Macmillan)

### 8 The Reformation and the Counter-Reformation

Educational significance of the Reformation. Luther, Melanchthon, Knox. The conception of religious education. Origin and constitution of the Jesuit schools. Merits and limitations. Effects of the laicization of the schools. Relation of the Reformation and Counter-Reformation to humanism.

*References*

Beard. Lectures on Reformation 16th Century. (Scribner)
Cambridge History, v. 2. (Macmillan)
Emerton. Desiderius Erasmus of Rotterdam. (Putnam)
Hughes. Loyola and the Jesuit System of Education. (Scribner)
Jebb. Erasmus. (Cambridge Univ. Press)
Painter. Luther on Education. (Lutheran Pub.)
Quick. Educational Reformers. (Appleton)
Swigerath. History of Education. (Herder)

### 9 Rise of realism and science in education

The humanistic and the realistic tendencies in education. Rise of realism and utilitarianism in education as opposed to humanism and culture. Verbal realism, Rabelais and Milton. Social realism, Montaigne. Bacon and the inductive study of nature. Comenius. The educational theories of Comenius. The rise of the conception of method in instruction. The place of Comenius in the history of education.

*References*

Barnard. English Pedagogy. (In his Papers for the Teacher. 1876. v. 5, 11). (Bardeen)
—— Education, the School and the Teacher in German Literature. (In his Papers for the Teacher. 1876. v. 3). (Bardeen)
Besant. Rabelais. (Lippincott)
Browning. History of Educational Theories. (Harper. Kellogg. *Bardeen*)

Comenius. The Great Didactic. (Macmillan)
Fischer. Francis Bacon. (Longmans)
Laurie. John Amos Comenius. (Macmillan)
—— Educational Opinion since the Renaissance. (Macmillan)
Monroe. Comenius and the Beginnings of Educational Reform. (Scribner)
Munroe. The Educational Ideal. (Heath)
Quick. Educational Reformers. (Appleton)
Williams. History of Modern Education. (Bardeen)

### 10 Education according to nature

Development of the conception of "natural" methods. Locke, Rousseau and Basedow. Rousseau and "education according to nature." Nature versus culture. Significance of the work of Rousseau.

*References*

Browning. Educational Theories. (Harper)
Compayré. History of Pedagogy. (Heath)
Laurie. Educational Opinion since the Renaissance. (Macmillan)
Morley. Rousseau. (Macmillan)
Munroe. The Educational Ideal. (Heath)
Quick. Educational Reformers. (Appleton)
—— Locke on Education. (Camb. Univ. Press)
Rousseau. Emile. (Appleton)
Russell. German Higher Schools. (Longmans)

### 11 Development of modern educational theory (the psychological aspect)

*a* Pestalozzi. Life and writings. Educational ideas. Relation of his work to the modern elementary school. The permanent significance of his work.

*b* Herbart. Educational theories. Methodology. Permanent contributions to educational theory.

*c* Froebel. Life and writings. Educational principles. The kindergarten. Influence upon subsequent theory and practice.

*References*

Barnard. Pestalozzi and Pestalozzianism. (F. C. Brownell 1861)
— Kindergarten and Child-study Papers. (Bardeen)
De Guimps. Life of Pestalozzi. (Bardeen)
Felkin. Herbart's Science of Education. (Heath)
Fröbel. Education of Man. (Appleton); *also* Education by Development. (Appleton)
Herbart. Outlines of Educational Doctrine (Lange). (Macmillan)
Munroe. The Educational Ideal. (Heath)
Pestalozzi. Leonard and Gertrude. (Heath)
—— How Gertrude Teaches her Children. (Bardeen)
*Quick. Educational* Reformers. (Appleton)

### 12 Development of modern educational theory (the sociological aspect)

The effects of the development of scientific conceptions on educational aims and values. Comte and Spencer. The knowledge of most worth. Realism in the theory of Spencer. Development of the contemporary notion of education as social adjustment.

*References*

Caird. Social Philosophy of Comte. (Macmillan)
Compayré. History of Pedagogy. (Heath)
Dewey. School and Society. (Univ. of Chicago Press)
Laurie. Educational Opinion since the Renaissance. (Macmillan)
Quick. Educational Reformers. (Appleton)
Spencer. Education. (Appleton)
Vincent. The Social Mind and Education. (Macmillan)
Ward. Dynamic Sociology. (Appleton)

### 13 Development of public education in the United States

The more important educational activities in colonial America. Character and influence of the academy in American education. The secondary school. Horace Mann and the common school revival. The normal school system. European influences in American education. The educational situation.

*References*

Butler. Education in the United States. (Lyon)
Brown. The Making of Our Middle Schools. (Longmans)
Dewey. The Educational Situation. (Univ. of Chicago Press)
Dexter. A History of Education in the United States. (Macmillan)
Hinsdale. Horace Mann and the Common School Revival in the United States. (Scribner)

### 14 Modern tendencies in education

Medieval guilds and the liberation of the laborer. Effects of the Industrial Revolution. The social problem presented by the industrial and democratic type of society. Origin and growth of industrial education. Industrial training in Germany, France and England. Education demanded for individual and social efficiency in America.

*References*

Addams. Democracy and Social Ethics. (Macmillan)
Cunningham. Western Civilization in its Economic Aspects. (Macmillan)
Dewey. School and Society. (Univ. of Chicago Press)
Ely. Studies in Evolution of Industrial Society. (Macmillan)
Herrick. Commercial Education. (Macmillan)
Hughes. The Making of Citizens. (Scribner)
Hadley. The Education of the American Citizen. (Scribner)
Walker. Discussions in Education. (Holt)
*Ware. Educational* Foundations of Trade and Industry. (Appleton)
*Youmans.* The Culture Demanded by Modern Life. (Appleton)

## C

### PRINCIPLES OF EDUCATION

### Books for study

Butler. The Meaning of Education. (Macmillan)
Dewey. School and Society. (Univ. of Chicago Press)
Harris. Psychologic Foundations of Education. (Appleton)
Horne. The Philosophy of Education. (Macmillan)
Shaw. School Hygiene. (Macmillan)

### Outline

#### 1 The study of education as a science

Possibility of a science of education. Relation between the history and the science of education. Threefold aspect of education as a science: (1) the physiological; (2) the psychological; (3) the sociological.

*References*

Dewey. Psychology and Social Practice. (Univ. of Chicago Press)
James. Talks to Teachers. (Holt)
Münsterberg. Psychology and Life. (Houghton Mifflin)
Royce. "Is there a Science of Education?" Educational Review, v. 1
Sinclair. The Possibility of a Science of Education. (Univ. of Chicago Press)

#### 2 The foundations of education

Basis of the educational process. Its presuppositions: (1) individuality and plasticity, (2) environment. Significance of the period of infancy in animals and in man. Education, training, instruction and culture. Typical statements of the educational aim. The aim of education as determined by its meaning. The social environment. Self-realization and social efficiency. Continuity of the educational process. Interrelation and interdependence of the various human institutions in the process. The special function of the school.

*References*

Bagley. The Educative Process. (Macmillan)
Bryant. Educational Ends. (Longmans 1887)
Fiske. Destiny of Man. (Houghton Mifflin)
Henderson. Social Elements. (Scribner)
Laurie. The Institutes of Education. (Macmillan)
Mackenzie. Introduction to Social Philosophy. (Macmillan)
Ross. Social Control. (Macmillan)

#### 3 The course of individual development

Interrelation of mind and body. Individuality and temperament. Growth and development of mind. The unity of mental life. Principles of mental development. Development of the child mind. Instincts, imitation, suggestion and play in mental development. Memory and habit. Significance of adolescence in education. Individual experience as a process. Its more important aspects. The function of intelligence.

*References*

Angell. Psychology. (Holt)
Baldwin. Mental Development. (Macmillan)
Bosanquet. Psychology of the Moral Self. (Macmillan)
Clouston. The Neuroses of Development. (Edinburgh 1891, Oliver and Boyd)
Hall. Adolescence. (Appleton)
James. Talks to Teachers. (Holt)
Kirkpatrick. Fundamentals of Child Study. (Macmillan)
Langdon-Downs. Mental Affections of Childhood and Youth
MacCunn. The Making of Character. (Macmillan)
Oppenheim. The Development of the Child. (Macmillan)
—— Mental Growth and Control. (Macmillan)
Thorndike. Educational Psychology. (Lemcke)
Vincent. The Social Mind and Education. (Macmillan)
Warner. The Study of Children. (Macmillan).

### 4 The course of study

The social function of the school. The meaning of the course of study. The two problems: selection and arrangement. The two bases for the selection of school studies: the psychologic and the sociologic. Educational values. Studies in their relation to (*a*) the capacities of the individual, (*b*) the nature of his social environment, (*c*) his capacity for usefulness. The curriculum as an organism. The interrelation and correlation of studies. Study and comparison of plans of correlation.

*References*

De Garmo. Interest and Education. (Macmillan)
Dewey. The Educational Situation. (Univ. of Chicago Press)
—— The Child and the Curriculum. (Univ. of Chicago Press)
Eliot. Educational Reform. (Century)
Findlay. Principles of Class Teaching. (Macmillan)
Gordy. A Broader Elementary Education. (Hinds)
Hanus. Educational Aims and Educational Values. (Macmillan)
—— A Modern School. (Macmillan)
McMurry. General Method. (Pub. School Publishing Co.)
N. E. A. Reports. (*a*) Report of Committee on College Entrance Requirements. (Univ. of Chicago Press)
(*b*) Report of Committee of Fifteen. (Amer. Book Co.)
(*c*) Report of Committee of Ten. (Amer. Book Co.)
Vincent. The Social Mind and Education. (Macmillan)

### 5 Method in teaching

Meaning of instruction and its relation to education. The psychologic and the logical view of knowledge. The psychologic basis of method. Its general principles. The function of the recitation. The conduct of the recitation.

*References*

Collar and Crook. School Management and Methods of Instruction. (Macmillan)
Dewey. The Child and the Curriculum. (Univ. of Chicago Press)
Findlay. Principles of Class Teaching. (Macmillan)
James. Talks to Teachers. (Holt)
McMurry. Method of the Recitation. (Macmillan)
Rein. Outlines of Pedagogics. (Bardeen)
Thorndike. Educational Psychology. (Lemcke)
Welton. The Logical Basis of Education. (Macmillan)

**6 Organization and administration of education**

Relation of the state to the school. Functions of the various types of schools. Problems of education in a democratic society. The technical school and its relations to industry. Administration and school supervision. The universities. The professional training of teachers.

*References*

Barnett. Teaching and Organization. (Longmans)
Chancellor. Our Schools; their Administration and Supervision. (Heath)
Eliot. Educational Reform. (Century)
Gilman. University Problems. (Century)
Hadley. The Education of the American Citizen. (Scribner)
Hanus. Educational Aims; *also*, A Modern School. (Macmillan)
Walker. Discussions in Education. (Holt)
Collar and Crook. School Management and Methods of Instruction. (Macmillan)

## D

### METHOD IN TEACHING

An examination will be required in at least two groups of subjects as given below. Each group is composed of related subjects taken from the curriculums of the elementary and secondary schools, with the exception of the foreign language group. Candidates who elect this group will be examined in only one language and in one other complete group, which the candidate may select.

### GROUP I

### English

| ELEMENTARY | | SECONDARY |
|---|---|---|
| Reading | Composition | Rhetoric |
| Language | Writing | Composition |
| Grammar | Orthography | Literature |

*Books for study*

Chubb. The Teaching of English. (Macmillan)

Hinsdale. Teaching the Language Arts. (Appleton)

Hall. How to Teach Reading. (Heath)

Arnold. Reading, How to Teach it. (Silver, Burdett)

Farnham. The Sentence Method. (Bardeen)

*References*

Parker. Talks on Teaching. (Kellogg)

Ruskin. Sesame and Lilies. (Holt)

Harrison, Frederic. The Choice of Books. (Macmillan)

Scudder. Literature in School. (Holt)

Reeder. The Historical Development of School Readers and Method in Reading. (Macmillan)

*Books for study*

Carpenter, Baker and Scott. The Teaching of English. (Longmans)

Laurie. Language and Linguistic Method. (Macmillan)

Bates. Talks on the Study of Literature. (Houghton Mifflin)

Corson. The Aims of Literary Study. (Macmillan)

*References*

Bowen, H. C. English Literature Teaching in the Schools. (L. Percival)

Lowell. Books and Libraries. (Holt)

Morley. Studies in Literature. (Macmillan)

Winchester. Principles of Literary Criticism. (Macmillan)

## GROUP 2

## History

### ELEMENTARY

#### *Books for study*

McMurry. Special Method in History. (Macmillan)

Report of the Committee of Seven. (Heath)

Report of the Committee of Ten. (Amer. Book Co.)

Report of a Committee of the National Historical Association on the Teaching of History in Elementary Schools. (In press)

#### *References*

Introduction to Channing and Hart's Guide to American History. (Ginn)

Dewey. Elementary Education; Chapters on History. (Univ. of Chicago Press)

Reports of the Association of History Teachers of the Middle States and Maryland

Reports of the New England History Teachers' Association

### SECONDARY

#### *Books for study*

Bourne. The Teaching of History and Civics. (Longmans)

Langlois and Seignobos. Introduction to the Study of History

Lamprecht. What is History? (Macmillan)

Report of the Committee of Seven. (Heath)

#### *References*

Frederic Harrison's The Meaning of History. (Macmillan)

Barnes, Mary Sheldon. Studies in Historical Method. (Heath)

Mace. Method in History. (Ginn)

Hinsdale. How to Study and Teach History. (Appleton)

Salmon. History: Suggestions as to Study and Teaching. (Macmillan)

## GROUP 3

## Mathematics

### ELEMENTARY

#### *Books for study*

Smith. The Teaching of Elementary Mathematics. (Macmillan)

McLellan and Dewey. The Psychology of Number. (Appleton)

Fitch. Lectures on Teaching. (Bardeen)

#### *References*

Conant. The Number Concept. (Macmillan)

Parker. Talks on Teaching. (Kellogg)

Report of Committee of Fifteen. (Amer. Book Co.)

Smith and McMurry. Mathematics in the Elementary School. *Teachers College Record*, March 1903

### SECONDARY

#### *Books for study*

Fink. History of Mathematics. (Open Court)

Young. The Teaching of Mathematics in Prussia. (Longmans)

DeMorgan. On the Study and Difficulties of Mathematics. (Open Court)

Young. The Teaching of Mathematics in Secondary Schools. (In press)

#### *References*

Row. Geometric Paper Folding. (Open Court)

Castle. Manual of Practical Mathematics. (Macmillan)

Gow. A Short History of Greek Mathematics. (Macmillan)

Ball. Mathematical Recreations. (Macmillan)

Report of Committee of Ten. (Amer. Book Co.)

## GROUP 4

## Science

### ELEMENTARY

Nature study
Geography

*Books for study*

Redway. The New Basis of Geography. (Macmillan)
Geikie. The Teaching of Geography. (Macmillan)
Bailey. The Nature Study Idea. (Doubleday)
—— The Outlook to Nature
Hodge. Nature Study and Life. (Ginn)

*References*

Scott. Nature Study and the Child. (Heath)
Faraday. The Chemistry of the Candle. (Harper)

### SECONDARY

Physiography
Biology and physiology
Physics and chemistry

*Books for study*

Lloyd and Bigelow. The Teaching of Biology. (Longmans)
Smith and Hall. The Teaching of Chemistry and Physics. (Longmans)

*References*

Report of Committee of Ten. (Amer. Book Co.)
N. E. A. Report on College Entrance Requirements
Proceedings of N. Y. State Science Teachers Association for 1901. (University of the State of New York)
Cajori. History of Physics. (Macmillan)
Ladenburg *or* Meyer. History of Chemistry. (Macmillan)

## GROUP 5

## Foreign languages

### Latin and Greek

*Books for study*

Bennett and Bristol. The Teaching of Latin and Greek. (Longmans)
Lodge. Helps for the Teaching of Caesar. Teachers College Record, May-September 1902

*References*

Hale. Aims and Methods in Classical Study. (Ginn)
—— The Art of Reading Latin. (Ginn)
*Tolman.* The Art of Translating. (Sanborn)

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The examinations for the renewal of college graduate limited certificates will be held each year in May and in August. The May examination will be held in New York, Albany, Syracuse and Buffalo, and at such other places as may from time to time be designated, in connection with the licensing examinations for entrance to the professions of law, medicine, dentistry, veterinary surgery, pharmacy, and nurse training. The August examination will be held at the various colleges in the State where summer courses are conducted covering wholly or in part the course of work outlined in this syllabus.

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| | *1907* | *1908* | *1909* | *1910* |
|---|---|---|---|---|
| May | 23-24 | 21-22 | 20-21 | 26-27 |
| August | 19-20 | | | |

## Daily program

| | *Morning*<br>*9.15* | *Afternoon*<br>*1.15* |
|---|---|---|
| 1st day | Psychology | History of education |
| 2d day | Principles of education | Methods |

Candidates desiring to enter any of these examinations should communicate with the Department at least two weeks before the date set, specifying the subjects in which they wish to be examined.

# New York State Education Department

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Gaps in the series indicate that the numbers are replaced by later editions or are for other reasons out of print.

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Continued in 1898 as reports of College and High School Departments. *See also B23*

**Examination Department bulletins 1895-98. O.**

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Historical sketch; laws, ordinances and rules pertaining to all Regents examinations and credentials; notes on the reorganization of 1890.

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**X10** Examination Papers 1896. 502p. *50c; small size uniform with previous volumes 25c, boards 50c.*

*See also* Question papers.

**X11** Davis, W. M. (Harvard) State Map of New York as an Aid in the Study of Geography. 28p. Nov. 1896. *5c.*

Based on topographic map in preparation by the United States Geological Survey.

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**New York State Education Department**

BULLETIN 353 OCTOBER 1905

# New York State Museum

JOHN M. CLARKE Director

## Bulletin 95

## GEOLOGY 9

# GEOLOGY
OF THE
# NORTHERN ADIRONDACK REGION

BY

H. P. CUSHING

| | PAGE |
|---|---|
| **Introduction** | 271 |
| **Summary of geologic history** | 272 |
| **Precambric history** | 273 |
| **Early Paleozoic history** | 279 |
| **Later Paleozoic changes of level** | 285 |
| **Paleozoic disturbances** | 286 |
| **Paleozoic igneous activity** | 287 |
| **Paleozoic erosion** | 288 |
| **Mesozoic history** | 289 |
| **Cenozoic history** | 290 |
| **Glacial history** | 292 |
| **Postglacial history** | 293 |
| **The rocks** | 294 |
| **Precambric rocks** | 294 |
| **Paleozoic rocks** | 354 |
| **Rock structures** | 399 |
| **Foliation** | 399 |
| **Folds** | 402 |
| Paleozoic rocks (*continued*) | |
| Faults | 403 |
| Joints | 412 |
| Topography | 416 |
| Introduction | 416 |
| Prepotsdam topography | 418 |
| Paleozoic topography | 419 |
| Appalachian uplift | 421 |
| Mesozoic base-leveling | 423 |
| Peneplains | 425 |
| Main axis of elevation | 427 |
| Lake belt | 429 |
| Faults as topographic features | 430 |
| North plain | 433 |
| Northern hills and valleys | 434 |
| Streams | 437 |
| Lakes | 445 |
| **Index** | 449 |

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Bulletin 95

GEOLOGY 9

# GEOLOGY
# OF THE
# NORTHERN ADIRONDACK REGION

## INTRODUCTION

The writer's work in the Adirondack region has been mainly confined to Clinton and Franklin counties, and what is set forth in the present report is mainly the result and summation of that work. In addition some detailed investigation has been done in western St Lawrence county and in the region about, and northward from, Little Falls in Herkimer county. Brief reconnaissance trips have also been made in Essex and Hamilton counties. Professors Kemp and Smyth have worked during the same period in other parts of the region. They were the pioneers and generously made room for me. We have all worked most pleasantly and harmoniously together and in consultation, in correspondence, and in combined work in the field have freely shared ideas with one another. How large a part of my present views concerning the geology of the region is due to this free intercommunication, I am wholly unable to say. I only know that the indebtedness is great, is fully appreciated and gratefully acknowledged.

The Adirondack region is in many respects a difficult one in which to study geology. The universal forest covering, the difficulty of getting about, greatly increased in burned districts and in those littered with the lumberman's refuse, the frequency of rains and the scarcity or absence of settlements in most of the district are hindrances to work in many respects, specially since the complicated character of the geology necessitates a careful survey of the whole ground. The work has been greatly hampered also by the very imperfect character of the maps available, the new maps as yet barely reaching the region under consideration. The healthful and invigorating climate and the abundance of pure water are great compensations in their way.

The problems presented for solution are of the most difficult sort. The interpretation of the present topography, the working out of the complex history of the region during Glacial times and the deciphering of the complicated structure and history of the older rocks of the region are all matters requiring long and patient labor and the undivided attention of the worker. The writer's attention has been centered mainly on the latter problems, hence such work as has been done on the others has been incidental, and the fragmentary character of the results obtained is fully appreciated. Prof. J. B. Woodworth is now occupied with these matters, and, when his work is extended over the immediate region, great and important additions to our knowledge are sure to follow.

The summary of the geologic history of the region with which the report opens is for the convenience of the reader. The detailed evidence on which that summary is based will follow later and must be taken for granted till presented.

## SUMMARY OF GEOLOGIC HISTORY

The rocks now exposed at the surface in the Adirondack region proper, are among the most ancient rocks known anywhere on the earth's surface, so that their record carries us far back, back to the remoter times of the geologic history of the earth. This early record is exceedingly difficult to decipher because of the great age of the rocks, because of the fact that they have been vastly modified in character by repeated action of great compressive forces, and because the rocks now at the surface were, at an early stage in the history of the region, deeply buried under several thousand feet of other rocks which have since been worn away. It was while thus deeply buried that the major part of this change from their original character was effected. But the character of the change brought about by compression varies with the depth of the rocks beneath the surface because of hightened temperature and pressure, and rocks may become so greatly modified as to lose all trace of their original character.

### Precambric history

**Old sediments.** The oldest rocks which have with certainty been recognized in the Adirondack region consist of certain well banded gneisses and schists, with bands of varying thickness of coarsely crystalline limestone. They are believed to be old water-deposited rocks, ancient sheets of sand, mud and calcareous mud, deposited on the floor of some large body of shallow water, in all probability the sea. They are now so greatly changed from their original condition that the structures and textures characteristic of rocks so formed have been almost wholly destroyed, being replaced by others which are not characteristic, since they may be produced in igneous rocks as well. The inference as to their original condition is based partly on their composition, and partly on the fact that they show frequent and rather abrupt alternations in character, as if they had originally consisted of beds and layers of varying composition, as water-deposited rocks do. There is apparently a great thickness of these beds, but their base has never been made out with certainty nor is their summit known, so that our ideas concerning their thickness are of the vaguest. They must have been laid down on a surface of older rocks; but we are at present wholly in the dark as to whether or not these older rocks are anywhere exposed in the district at the present time. Rocks which may not improbably represent them, are present and will be shortly described, but no exposures which will enable a decision in the matter have been discovered, nor are they likely to be in the immediate district, though perhaps such may be found to the west or south.

Though unknown, the thickness of these deposits is great, with repeated changes in character, so that it is beyond question that the submergence endured for a long, a very long time, during which many changes in conditions occurred, as shown by the changes in character of the rocks.

Closely involved with these rocks are others which would seem to be of igneous origin, so far as may be judged from their composition. The great changes which they have undergone have destroyed their original characters utterly, and they have been stretched out into bands parallel with the associated sediments, causing them to appear as an integral part of the series. It seems quite certain that they are, in part at least, igneous, and that they must be somewhat younger than the sediments, except in so far as they may possibly represent subaqueous surface flows, yet they can not be greatly younger, since they have undergone much the same changes, both in kind and in degree, that the sediments have experienced. Wherever the sediments occur, these igneous rocks are sure to be found associated with them, thus indicating widespread and profound igneous activity at the time.

**Rocks of doubtful age.** In many parts of the region, and running in a broad belt across Clinton and Franklin counties, is found a group of old rocks, profoundly changed from their original condition, which seem to be wholly of igneous origin, so far as can be judged from their composition; at least no rocks similar to those of the preceding group and which are judged to be sediments occur with them. They have been equally, if not more changed from their original condition than have the rocks of the preceding group, and all traces of their original structures have been destroyed. It is by no means impossible that they are older and represent the rocks of the floor on which that group was laid down; indeed, if any remnants of that floor remain, we have them here. But, since similar rocks, in general not to be distinguished from them, occur associated with the sediments, where they are clearly as young, or younger, these may represent great masses of such rocks, massed in such amount as to have wholly displaced the sediments. We are not able to decide these questions as yet. If but one rock group is represented, it is no older than the sediments. If more than one be present, one may be older. But, if so, we as yet lack the means of discriminating between them.

The rocks at present found in the district embrace only a fragmentary remnant of those formed at this early time, a great thickness of other rocks having been laid down above them and later worn away. Twenty thousand to twenty-five thousand feet is not an exaggerated estimate of this thickness. It is not meant to imply that a uniform amount has been removed from the whole district, in fact there is every reason to believe that the opposite is true, that the region has been for much of its history a rugged one, and that much greater removal has taken place from the hights than from the depressions. While this accumulation of the rocks which have since disappeared was in progress, the region was in all probability below sea level and keeping pace with the deposit by a slow subsidence. Not improbably a great part of the accumulated thickness consisted of igneous rocks.

**Great igneous intrusions.** After the present surface rocks had become deeply buried, they were invaded from beneath by a series of great igneous intrusions, broken up into patches and no doubt pushed upward to a considerable extent. At the time of the appearance of these intrusions the previous rocks had become profoundly changed in character, so that they were much in their present condition. The district embracing Essex, southern Franklin and northern Hamilton counties felt the full force of this invasion, the larger part of the present surface rocks in that district consisting of these igneous rocks, while away from it they occur merely in patches. The present rocks cooled far beneath the old surface and have been brought to the present one by wear and removal of the overlying rocks. They represent abyssal, cooled masses, whence no doubt much molten material ascended toward, and not improbably to, the old surface.

These rocks may be grouped into four great classes, anorthosites, syenites, granites and gabbros, all undoubtedly derived from some great parent molten mass below by some process of differentiation. The anorthosite intrusion was the first, the bulkiest, and is the only one whose precise limits have so far been worked out. It was followed by one of syenite, that by one of granite, and the gabbro intrusion seems to have been latest of all.

All three have a much wider range and a more patchy distribution than the anorthosite. Their precise importance is however uncertain, since there are certainly granites and gabbros, and likely syenites also, of more than one age in the region, though quite similar to one another, so much so that no criteria have yet been developed for their discrimination. This difficulty has not to be met in the case of the anorthosite.

At some time after the cooling of these great intrusions the whole district was subjected to great compression, as a result of which all the existing rocks were profoundly changed in character, the intrusives as well as the older rocks. But, since the igneous rocks did not experience the earlier compressions, as did the others, and since these must have been profoundly affected by the heat and pressure of the intrusions themselves, the intrusives are less completely altered than are the older rocks, and frequently retain traces of their original structures and textures, often in considerable amount, so that usually their origin and nature are not open to question. This is specially true of the anorthosites, which are mostly very coarse grained, porphyritic rocks, but it is frequently true of the others also. The rocks were more or less mashed and recrystallized, and rendered gneissoid in greater or less degree, the same rock varying much from place to place in these regards. It is the more gneissoid phases which are most difficult to distinguish from some of the older rocks.

The character of the changes produced indicates that the rocks were under great load during the compression, or, in other words, were deeply buried beneath overlying rocks.

**Great Precambric erosion.** Precambric time was very long, not improbably comprising as much as or more than one half of the earth's geologic history. During most or all of the later part of this vast time interval the region was a land area and undergoing wear. The overlying great thickness of rock under which the present surface rocks lay buried at the time of compression, was removed in Precambric time in greater part. Quite likely the time of elevation into a land area coincided with the time of compression, the two being effects from the same cause. The great igneous intrusions may also have aided or initiated the upward movement. The great thickness of rock removed indicates the probability of more than one upward movement, since it is unlikely that the region ever had an altitude equal to the bulk of removed rock. Periods of depression beneath the sea may have alternated, though it is improbable that these could have had any great duration, or we should surely find traces in the region of the deposits formed, and these we do not find. It is impossible to state positively the amount of rock removed during this great denudation, but in all likelihood at least from 3 to 5 miles of rock thickness were worn away from the surface, and perhaps considerably more, specially locally.

**Surface topography at the close of the erosion interval.** The land surface left at the termination of this long period of wear is of such nature that it could have been produced in no other way than by long protracted erosion under conditions of stability of level. After the last uplift of the region the streams sawed their valleys down to grade; and the slow processes of valley widening continued at their work of broadening the valley bottoms and narrowing the upland divides between the valleys, till the latter were largely obliterated, and the resulting surface was one of small relief, broad, shallow valleys, largely adjusted to the weaker rock beds and structures, separated by low, gently sloping divide ridges, with occasional low, rounded hills of extraresistant rock protruding above the general level, with elevations of only a few hundred feet above the valley floors as a maximum. To produce a land surface of this sort, specially on such resistant rocks as those of the Adirondacks, requires a vast lapse of time. The surface was not equally planed down in all parts of the region, but was somewhat more irregular on the present northern and eastern borders than on the southern and western, though the discrepancy is not marked. Over much of the surface the rocks were deeply weathered and decayed, forming a deep soil, but the evidence in this regard is conflicting, and apparently decay was less advanced on the northeast than elsewhere.

**Later Precambric disturbances.** During the long Precambric erosion period the present surface rocks were gradually approaching the surface as the overlying rocks were, bit by bit, removed. They were therefore under progressively less and less load of overlying rocks, and, if subjected to compression during this stage, the effects produced would be very different from those brought about by compression under great load. That the rocks were so affected when much nearer the surface is clear, the main result being the production of the highly inclined or vertical, rather even cracks or fissures known as joints. There have been later times of joint formation in the region also, and the different sets are difficult of discrimination. But it is clear that there was some development of joints and faults, indicative of stress, at this time.

**Late Precambric igneous activity.** During most of the long period of denudation which followed the time of the great igneous intrusions there was an absence of igneous activity in the region, at least in so far as near surface effects were concerned. But toward the close of the period, when the present surface rocks were no longer deeply buried, but were comparatively near the surface, molten rock again came up from beneath, likely from the same source whence the material of the great intrusions sprang. Whether any of this molten rock reached the surface then existing can not be determined, since no vestige of that old surface now remains, but in all probability there was volcanic action at the surface. The lavas utilized a system of east and west fissures or joints as their channels of ascent and eventually cooled and solidified in them. Such lava-filled fissures are known as dikes, and these dikes are very numerous in portions of the region, specially at the northeast. Their upper parts, along with their surface outpourings, were worn away long ago. Could they be followed in depth, they would lead eventually to the reservoirs which supplied the material with which they are filled.

There are two sets of these dikes, showing that there were at least two separate periods of igneous action at the time. The more common dikes are of heavy, dense, black rocks of the sort known as diabase. The others are less dense and heavy, usually of red color and have the composition of syenites and granites. The latter are somewhat the older. The northeastern Adirondacks were the main scene of this igneous activity. The red dikes are practically confined to Clinton county. The black dikes are much more numerous and have a much wider range, but are vastly more abundant in Clinton and Essex counties than elsewhere.

Erosion still continuing after the close of the igneous activity, all vestiges of the surface volcanics disapppeared, along with a thickness of rocks of considerable amount, but to be measured in hundreds, rather than in thousands of feet.

### Early Paleozoic history

The long period as a land area finally came to an end, a movement of subsidence was initiated in the region and it became depressed, slowly passed beneath the level of the sea and began to receive deposit on the rather evenly worn surface, the valley bottoms necessarily passing beneath the sea before the low divides were overtopped. This subsidence began at the northeast and slowly progressed southwestward. As zone after zone came within reach of the cutting of the waves, they would tend to pare it away to a smooth surface, and in parts of the region this wave action may have been a considerable factor in evening it. As zone after zone passed beneath the sea, deposit would commence on the surface, and, as the subsidence began on the east and northeast and progressed westward and southwestward, deposits of progressively younger and younger age appear resting on the old land surface in passing from east to west, producing what is called overlap. Because of this, the earliest paleozoic deposits, those of Lower and Middle Cambric age, do not appear about the Adirondack region at all, though found not many miles to the eastward, where they were deposited in a separate basin. Because of this, the Potsdam formation, or Upper Cambric age, does not appear on the west and south of the Adirondack region, though in great force on the north and east.

**Potsdam formation.** This coarse, often pebbly, massive sandstone *deposit was the* first formation laid down on the old land surface of the present Adirondack region. It was deposited in shallow water under conditions of sufficiently vigorous wave and current action to remove all fine mud particles, which were swept away and deposited elsewhere in deeper water. In Clinton county a thickness in excess of 800 feet, perhaps more than double that amount, of this sand accumulated before changing conditions brought about a change in the character of the deposit. The water must have been shallow throughout, hence the rate of subsidence could not have exceeded the rate of accumulation. This thickness diminishes westward and southward, and the sands are mostly absent from the west side of the region, as has just been stated. With diminishing thickness, it is apparently the lower beds that disappear. The basal portion of the formation in Clinton county seems to be the oldest of the deposits in the Adirondack region, and its often coarsely pebbly character and abundant content of undecayed feldspars indicate vigorous wave action on rocky shores of resistant, unrotted rocks. The upper portion of the formation here, and most of it elsewhere, consists of pretty pure quartz sand, indicative of prevailing different conditions from those above, namely that either the feldspars had been pretty thoroughly rotted previous to submergence, or else that they experienced the triturating action of the waves for a sufficient length of time to be wholly ground fine, while the somewhat harder quartz yet remained coarse, implying a slower rate of subsidence. The former is much the more probable cause, though no doubt the latter had some influence also.

The present Adirondack region must have supplied much of the rock material thus spread on the sea floor, and the drainage of the district must have been mainly to the north and east. The present western border of the region was but slightly submerged during this time, and for part of the time the waters were clear, with deposit of limestone instead of sand. The upper part of the formation around the Adirondacks is certainly a marine deposit and holds marine fossils. These are lacking in the larger part of the formation, and this, together with its character, suggests the possibility that the larger part of the formation on the north was deposited in a closed or nearly closed basin.

**Beekmantown formation.** By the close of Potsdam time the sea had encroached for a considerable distance on the present northern and eastern portion of the Adirondacks, but there was yet a large land area remaining in the heart of the region which on the west and southwest extended somewhat beyond the present surface limit of the Precambric rocks in these directions. During Beekmantown time submergence was in progress on all sides of the Adirondacks, but it was most rapid, and to greatest amount on the northeast and diminished to the south and west, the rocks having treble the thickness in the lower Champlain valley that they have along the Mohawk. On the extreme west the amount of subsidence was but slight and little deposit took place.

The Beekmantown rocks are in large part peculiar, and except for the fact that they are clearly water-deposited rocks, the precise conditions under which they were deposited are difficult to understand. In the upper portion of the formation are many pure limestone beds, often containing numerous fossils, and so far as these are concerned the formation seems clearly a marine limestone. These beds seem to be limited to the east and north sides of the region and to be wholly lacking on the south and west. The bulk of the formation everywhere is made up of beds of sandy dolomite. The sand is mostly rather coarse and is embedded in a fine mosaic of crystalline dolomite. There is little mud in the formation and fossils are either wholly lacking or else exceedingly rare. The sands imply vigorous water action, sufficiently so to transport them to their present resting place and to wash away all fine mud. Yet the sand forms less than 25% of the whole formation, the bulk being dolomite, along with some calcite. The nature of the deposit would suggest a chemical, rather than an organic origin for this material, since the waters must have been shallow, and this would imply estuarine *or closed basin* conditions of deposit, stream waters holding lime and magnesium carbonates in solution, with frequent storm waters sweeping in sands from the adjacent land, and likely a climate of some aridity. That is, there must have been a land barrier to the eastward separating the basin from the Atlantic, and another to the westward shutting it off from the interior sea, with a considerable Adirondack island in the midst of the sea, on whose slopes the different beds of the formation overlapped as subsidence progressed. The whole subject is beset with difficulty and needs thorough investigation, something that it has not yet received.

Because of the greater thickness of the formation in the Champlain valley, and because the upper marine limestones occur only there and on the north, it is reasonable to suppose that the subsidence here opened a northeasterly connection with the sea, whence the marine forms entered the basin. Likely at about the same time subsidence ceased on the south and west and was not improbably replaced by uplift, raising the region above sea level and preventing the deposit of the marine limestones there. Such an uplift certainly occurred shortly after, and may well have begun then.

As a result of the Beekmantown subsidence and deposit, the land area of the Adirondacks was much diminished in size; though there still remained an area, mainly on the south and west, which was not submerged. Then came the uplift, which much increased the extent of this land to the south and west.

**Chazy formation.** In the Champlain valley the Beekmantown formation is overlain by a considerable thickness of mostly quite pure, marine limestone beds containing abundant fossils. Followed to the north into Canada, these deposits change into sands and muds to a considerable extent, showing that a land area which supplied this land wash must have existed in that direction. How much of the present northern Adirondack region was overspread by the Chazy sea can not be told, but it would seem that it must have been mainly submerged, since no land wash from it reached the present Champlain valley region. Followed to the south, the Chazy deposits rapidly thin out, and the formation was not deposited on the south and west sides of the region at all. Subsidence thereabouts must therefore have intermitted during Chazy time and likely during the latter part of Beekmantown time as well. In fact, the downward movement seems to have been replaced by one in the contrary direction, bringing above sea-level an area of considerable, though unknown, extent to the south and west of the Adirondacks, a condition in which it remained throughout Chazy time. The altitude above sea-level must have been very slight, since the surface shows little sign of wear.

The Chazy basin then spread over the north and east sides of the region only, its open water connection being with the eastern, and not with the interior sea, the extent of the latter being considerably contracted during this time.

**Lowville limestone.** This is a comparatively thin band of pure limestone which directly overlies the Beekmantown on the south and west sides of the Adirondacks, but does not appear at all on the north and east. The Chazy elevation on the southwest was terminated by depression, and at about the same time or previously, elevation occurred, draining the sea from the Chazy basin. The Lowville is plainly unconformable to the Beekmantown surface, varies much in thickness and is wholly wanting in places, evincing the irregularity of surface on which it was laid down.

The conditions under which the Lowville was deposited did not permit the entrance of, or else were unfavorable to the life of a marine fauna. If the former be the explanation, there must have been a land barrier between it and the sea to the south; if the latter, the cause is purely conjectural. Certainly the rock is very barren of fossils for the most part.

**Black River and Trenton formations.** Both the Chazy formation on the northeast and the Lowville on the southwest are overlain by a series of limestone beds which are plainly of marine *origin, showing* that following the Lowville, subsidence was inaugurated all about the Adirondacks causing the interior sea to spread northward and eastward over the entire region. The Black River is locally absent along some of the southwest border, owing to slight irregularities in the floor on which it was laid down, and less frequently some of the basal Trenton is absent from the same cause. Whether these irregularities were due to wear or to slight folding has not been determined.

While apparently some slight remnants of the old Adirondack island persisted above sea-level during the whole or part of the Trenton, it is probable that they were of insignificant extent and likely confined to the southern part of the region. With these possible exceptions the sea of the closing Trenton seems to have overswept the entire Adirondack region.

The Black River and Lower Trenton are quite pure limestone deposits and hence clear water formations. But the Trenton soon comes to show some mud admixture, at first slight and intermittent but slowly increasing in amount, till finally it equals and then exceeds the lime, and the deposit becomes a calcareous shale rather than a limestone. These muds came from some land area to the eastward and progressively invaded the sea toward the west, so that limestone was still in progress of formation on the west while shales were forming to the east.

**Utica formation.** The limestones of the Trenton pass gradually upward into shales through increasing invasion of mud from the east. Trenton submergence was much interrupted on the south and southeast, so that the formation is much thinner there than on the west and the northeast. In the latter locality the greater thickness is likely due to more rapid, or to less interrupted subsidence. On the west it is, at least in part, due to the gradual encroachment westward of the muds. Eventually however the conditions of mud deposit held sway over the entire region and far beyond. The sea was not deep, and the muds were swept in by currents moving toward the southwest. Subsidence was considerable, so that several hundred feet of shales accumulated in nearly all parts of the region, and in some portions a much greater thickness.

This submergence apparently completely overswept the old Adirondack island, and that for the first time in its Paleozoic history, with the possible exception of the latter part of the Trenton. The whole of New York State would seem to have been submerged and that for the last time in its geologic history.

### Later Paleozoic changes of level

Toward the close of Utica time subsidence became again interrupted and an upward movement was initiated. It was first felt on the northeast, bringing the northern Adirondack region again above the sea, and it has in the main remained a land area from that time to the present. The movement of elevation progressed to the south and west till all of eastern New York had been brought above sea level. From this time on the oscillations of the southern and western borders of the present Adirondack region now admitted the sea to unknown distances on the flanks of the region, now again excluded it. Thus the Medina, Clinton and Helderberg seas of the Siluric and Devonic quite certainly overlapped the margin of the region to some extent, and later Devonic seas may well have done likewise. The district was near the shore line of those seas, alternately received deposit and experienced wear as the position of the shore line fluctuated. The truncated edges of the deposits of those seas now come to daylight to the south of the Mohawk valley in successive order of deposit, their formerly existing extensions northward having been worn away. Hence, while it is obvious that they formerly extended considerably north of their present limits, the amount of such extent is purely a conjectural matter.

While the sea border was hugging the south and west sides of the region, the remainder was out of water and so continued with the possible exception of the submergence of a Champlain valley strip during Helderberg time. Such a submergence is very probable, but the amount of area so depressed is purely conjectural, the deposits of the time having utterly disappeared, owing to subsequent erosion. This is, so far as known, the only time that any portion of the northern Adirondack region has been beneath the sea since the close of the Utica, except for a submergence of the Champlain valley in very recent times. In all likelihood it was a depression of a channel, rather than of a wide area.

### Paleozoic disturbances

Aside from the repeated oscillations of level in the region during Cambric and Siluric times, which have just been outlined, there were periods of more considerable disturbance. Following Utica deposition and uplift there came such a time. Compression acting from the east effected the elevation of the Taconic range with some folding and fracturing of the rocks, and in a minor way the Adirondack region was affected. Again toward the close of the Paleozoic the stresses which produced the folding and uplift of the Appalachian region must have been felt in this region also. Not unlikely there were other times of lesser stress. The effects produced on the rocks of the region during these various times were the same in kind, and, though the sum total of all can be recognized, the relative amount to be ascribed to each period can not be ascertained. The main results were the production of faults and joints in the rocks.[1] Minor undulations, or folds, were also produced, but these are relatively insignificant and entirely subsidiary to the other effects. The eastern Adirondack region by no means felt the full force of either disturbance, and in the west the effect was much less than in the east. The major line of both disturbances swerves round, and approaches the region most nearly at its southeast corner.

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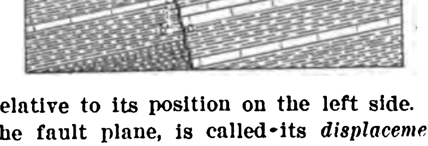
[1] A fault is produced by a sliding movement of the rocks on opposite sides of a fissure, with the result that the same rock stratum is higher on one side than on the other, as illustrated in the accompanying diagram. The stratum AA has been dropped on the right side of the fault relative to its position on the left side. The distance *ac*, measured along the fault plane, is called its *displacement*, the vertical distance *ab*, that separates the two ends of the stratum, is called the *throw*, and the horizontal distance *bc* is the *heave* of the fault.



The main faults of the region run across it with a general n.n.e.-s.s.w. course, but they curve repeatedly, and a given fault seldom holds a given direction for any great distance. In nearly all cases the dropped block is on the east, and the raised block on the west side of the fault plane. The resulting topography must have consisted of relatively narrow platforms terminated westward by cliffs of varying hight, depending on the throw of the fault concerned, rising to the level of the next platform above, the whole with a general n.n.e.-s.s.w. trend. Thus seems to have been produced for the first time the considerable and rather abrupt difference in level between the Adirondack region and the Champlain valley. The eastern Adirondack region was thus given a considerable elevation, with a rapid, steplike fall to the eastward and a gentler and steadier slope to the west.

Some few of the faults downthrow to the west instead of the east, producing between such a fault and the next easterly throwing fault to the westward a depressed block or valley with steep inclosing walls on both sides.

In addition to the main faults are a multitude of minor ones grading down to the merest slight slipping along the joint planes. Many of these are cross faults of considerable magnitude, making large angles with the main ones, and cutting up the main platforms into a series of segments at various levels.

It is likely that most of these faults date from the time of the Appalachian uplift of the late Paleozoic. A beginning may have been made by the Taconic disturbance.

### Paleozoic igneous activity

Initiated possibly by the disturbances which effected the elevation of the Taconic mountain range, though more likely of late Carboniferous date, came renewed igneous action. Here again all traces of surface volcanic action, if there was such, have been removed by subsequent wear, and the only signs of the activity which remain are the old, lava-filled channels of ascent, the dikes, together with a few larger masses, which paused before reaching the surface and crowded out a place for themselves by squeezing laterally between the rock layers, and bodily raising the overlying rock. Here again we find two sharply contrasted sorts of lava, one light colored and difficult to render thoroughly fluid, the other black and fusing at a much lower temperature. Here again the black rock is much the more abundant and with wider distribution. But here such evidence as there is shows that the black rocks were the first, instead of the last to appear, as in the case of the late Precambric dikes.

In New York these rocks are confined to the near vicinity of Lake Champlain, in Essex and Clinton counties. Apparently the Adirondack region was on the extreme edge of the district affected.

In the Mohawk valley and westward, occasional dikes are found of a very different character from those along Lake Champlain, which are perhaps younger than they are and represent intrusions from a different source. They are so few in number and so scattered that they indicate only a trifling amount of igneous activity. If there can be said to be any well marked center of action at all, it was about Syracuse. If there were any surface volcanos, they must have been few and small.

### Paleozoic erosion

Throughout the latter part of the Paleozoic the Adirondack region was a land area, and, if the assumption that a considerable amount of the faulting of the region dates from the time of the Taconic disturbance be correct, this land area had a considerable elevation on the east and northeast, diminishing gradually to the west and south, with the Champlain valley outlined as a result of the faulting. The time involved is great, several millions of years at least, and a large amount of erosion must have been accomplished, specially on the more elevated areas. The cover of paleozoic deposits must have been swept away over a considerable portion of the interior region, where it was thinnest, and the general surface much evened by erosion. So far it has been found impossible to separate this erosion interval from that which followed, so far as results are concerned. All of the surface left by the former seems to have been removed later, and it can be simply inferred that much wear took place. In all probability the great Appalachian disturbance, near the close of the Paleozoic, must have been strongly felt, causing renewed movement along the fault planes provided they were in existence, and a considerable increase in the altitude of the region.

### Mesozoic history

During early Mesozoic times there were disturbances of considerable amount in the eastern part of the country, whose effects may well have been felt in the Adirondack region. A subsidence of long, narrow troughs, parallel to the general trend of the Appalachians, took place; deposits accumulated in these troughs, often to very considerable thickness; large quantities of quite fluid igneous rock ascended from below, in part reaching the surface as great flows, in part thrusting a way between layers of the accumulated sediments as interbedded sheets; faulting on a large scale followed, breaking up the surface into a great mosaic of fault blocks. It is quite possible, nay probable, that further movements took place along the Adirondack faults at this time, and additional faults may have formed. It is also possible that, because of downfaulting, deposits may have accumulated in the Champlain and upper Hudson valley troughs. Evidence has recently been forthcoming of volcanic action, probably of this date, on the immediate southeast margin of the Adirondack region, and the future may bring to light similar evidence elsewhere.

However this may be, the further faulting would have produced additional elevation of the Adirondacks with increased altitude above the Champlain valley, and inaugurated another period of active erosion tending toward a new and lower base level. On the mosaic fault blocks of the valley the amount of possible erosion would largely depend on relative altitudes, and great variation in the amount is to be noted on adjacent blocks, Potsdam, Beekmantown, Chazy, Trenton and Utica rocks, even Precambric as well, all being found as surface rocks near the lake level today, often in close proximity. Where Utica rocks are at the surface, the total amount of wear since Utica time has been exceedingly small, and the surface must have been for much of the time near base level. Moreover, such blocks were the most downfaulted of all and must have formed depressed basins with every period of renewed faulting, as such receiving deposit from the surrounding higher blocks as these were worn down, thus protecting their own surfaces from wear for long intervals.

This erosion interval was so protracted, extending through the greater part of Mesozoic time, that the whole region was finally planed down to a surface of little relief, broad shallow valleys and low divides, with occasional low, rounded hills or clump of hills where extraresistant rocks occurred, or where favorable location prevented maximum wear. The fault cliffs, or scarps, were entirely wiped out as topographic features, the raised side being worn down to the same level as the dropped.

In the southern and western Adirondack region this old surface is still recognizable, as the upland surface into which the present valleys are cut, the old residual hills rising above it now as they then did. The present plateau upland of southeastern New York would seem to represent a continuation southward of this same old surface; and, if this be the case, the result in the Adirondacks was simply a local development of conditions which prevailed widely in the eastern United States at this time.

### Cenozoic history

This long period of quiet wear was terminated by another uplift, which would seem to have occurred at the close of Mesozoic, or the beginning of Cenozoic time. This uplift inaugurated another erosion cycle with a much lower base level. In the Adirondack region this uplift was, at least for the northern part of the district, of a dome-shaped character, the major axis of the dome being along a nearly north-south line closely coinciding with the line between Clinton and Franklin counties, thence turning southwestward; the minor axis running through the extreme south of Franklin county and thence eastward through Essex. In the eastern Adirondacks this uplift was complicated by further shifting along the fault planes, bringing fault cliffs, or scarps, again into prominence as topographic features; reelevating anew the eastern region as contrasted with the Champlain valley, and reproducing the comparatively rapid, steplike drop from one to the other; and breaking up the old, comparatively even erosion surface into a jumble of disconnected blocks at various altitudes. Hence the present ridge and hilltops appear at all sorts of discordant elevations, instead of exhibiting the concordance in altitude which is such a characteristic feature on the south and west, where there was little or no faulting.

Not far to the west of the main axis of uplift lies a central depressed belt whose ridge summits fall far short of attaining the elevations along that axis, and much short of attaining those to the west. These differences are most accentuated through Franklin county, and the belt seems to have originated as a depressed, or dropped fault block, between the eastern and western uplifted areas. Whether it originated at this time, or dates back to a previous period of faulting, with renewal of its previous features at this date, can not be told.

The region remained at the new altitude given by the uplift for a sufficiently long time (the greater part of the Cenozoic) to permit of erosion giving it approximately its present relief. Stream valleys were cut down to the new base level and on the average sufficiently widened, so that one half of the region (at a rough approximation) was cut down well toward that level, the remainder forming interstream ridges and hills whose summits have been lowered little below the altitude given them by the uplift. The streams had become adjusted to the rock structure of the region during the previous cycles of erosion, so that they coincided with, and their attack was mainly felt on, the weaker belts. In the heart of the region, where Precambric rocks are at the surface, the weaker rocks are the Grenville limestones and associated sedimentary gneisses. Wherever these rocks occurred in belts of any extent, they would locate the line of a stream valley, whose width would be rudely proportional to the breadth of the belt. The remaining common rocks of the region are much more resistant and with no great variation among themselves in this respect, so that they present little comparative inducement to valley-making, and the principal remaining lines of weakness are structural, lines of faulting and of repeated jointing. The main joint directions vary somewhat in different parts of the region, but there is always an important set with a direction approaching parallelism with that of the main faults, and many of the main valleys of the region have this trend, this being specially noteworthy in the eastern district where faulting has been most pronounced.

Because of the dome-shaped character of the uplift, the tendency has been to locate the main watershed of the region at its apex, with a radial arrangement of the main streams with respect to it. Moreover, since the sides of the dome have a slightly greater slope than the graded slope of the streams, the valleys are cut to greater depth in the heart of the region than on its flanks. The vertical distance between the old and new base levels is greatest there.

When we pass to the Paleozoic rocks which everywhere surround the region, dipping slightly away from it, the stream adjustments necessarily differ, owing to the different character and arrangements of the rocks, which lie with their exposed edges parallel to the border of the region. The original radial streams flowed across these beds, but the tributaries which developed to these radial streams flowed along them and would develop mainly on the softer belts. With successive uplifts of the region, these adjusted streams would be more advantageously situated than many of the radial streams, and would increase in size at their expense, converting them into tributaries. This process has had much to do with the production, on all sides of the region of main drainage valleys parallel with its sides, though by no means the only factor involved.

### Glacial history

This long erosion period was terminated by the great change in conditions which ushered in the Glacial period. The long and complicated history of the region during Glacial times is but *imperfectly* known. It was well within the field of action of the great Labrador ice sheet for a long time. From analogy with other regions it may be inferred that there was more than one advance and retreat of ice sheets over the district, but how many and how extensive are purely conjectural matters for the immediate region. The last ice advance destroyed, for the most part, the traces of the presence of its predecessors.

Coming down on the region from the north and northeast, the Labrador ice sheet had its advance opposed by the elevated mass of the Adirondacks and was forced aside by it into two great ice streams which worked their way around the region. The one advanced up the St Lawrence valley and turned south along the west side of the Adirondacks, and thus reached and entered the Mohawk valley from the west; the other moved south through the Champlain valley, reaching the Mohawk at the east end. As the ice increased in thickness, it encroached more and more on the flanks of the region till finally it overswept the whole, and persisted in this condition for a long time. While the basal currents of the ice continued to be controlled by the topography, the main mass swept over the region in a general southwesterly direction. Ultimately changing conditions brought about recession. The thickness was least over the highlands, and the ice would first disappear there, leaving the two great currents sweeping round the region, as they did during the advance. These slowly dwindled and disappeared northerly.

The final disappearance of the ice left the topography modified both by glacial wear and glacial deposit, but with its larger features little changed. Ridge slopes were smoothed, summits rounded, valleys clogged with deposit, lakes produced either by inequality of deposit or by local excessive downward erosion, stream courses more or less modified, a host of minor changes much altering the appearance of the region.

### Postglacial history

During the continuance of glaciation changes in altitude took place, and at the time of final melting away of the ice from the St Lawrence valley the elevation was much less than at the beginning of glaciation, was in fact sufficiently low to enable the sea to run up the valley into Lake Ontario and to invade the Champlain valley also, producing a huge, branching estuary. In these waters marine sands and clays were deposited, and, though unconsolidated, these still remain in considerable bulk, their marine origin distinctly shown by the marine fossils which they contain.

Gradual elevation of the region since, greatest at the northeast, and amounting to about 600 feet at the lower end of Lake Champlain, has brought the region above sea level and shrunk the St Lawrence estuary to its modern proportions. This upward movement is probably still in progress.

But a few thousand years have passed since the ice disappeared. Erosion has made but little progress in obliterating its traces except along the immediate stream valleys. Since the streams have been more or less shifted from their preglacial courses, they have been obliged to recarve their valleys in whole or in part, and they are actively at work at this task. The steady rise of the land in postglacial times has given them a steadily lowering base level, and, though they have cleared away much of the glacial deposit from their paths, the amount of rock cutting done is not great.

## THE ROCKS

### Precambric rocks

While in many parts of the Adirondacks areas of varying size are found in which the rocks that occur may be unhesitatingly classed as Grenville sediments or as later igneous intrusions, over much of the district this is not the case, but an intimate admixture of various rocks is found, in apparently hopeless confusion. Thus we find Grenville sediments elaborately interbanded with other rocks, apparently igneous, yet seemingly conformable with them as an integral part of the series. We also find rocks which are not to be distinguished in appearance or in composition from the rocks of the great intrusions, except for perhaps a more thoroughly gneissoid character, and yet so interwoven with other rocks, so far as yet known not represented in the great intrusions, that it hardly seems possible that the two can belong together. There are also considerable areas of gneisses which are quite like the uncertain gneisses involved often with the Grenville rocks, yet without any Grenville admixture, and the relationship of such rocks forms a very difficult problem. The Grenville belts and patches and the areas occupied by the later igneous intrusions have been in the main discovered and mapped. There yet remains the exceedingly difficult problem of the separation of these mixed belts into their several elements, and the working out of their affiliations. This is likely in many cases to prove impossible, and in nearly all cases the amount of intermingling is so great as to render attempts at detailed mapping of the several elements futile, and to require their designation as belts of mixed rocks.

**Grenville rocks.** The most characteristic of these are the limestones. They are always thoroughly, and usually coarsely crystalline marbles, which even when purest contain scales of graphite. They vary greatly in purity and usually contain green and white pyroxenes, apatite, phlogopite, quartz and scapolite, often in large quantity. In the thick beds these are more apt to be concentrated in the outer portions, in fact the limestone often grades into a pyroxene quartz rock, with or without scapolite, or else into a nearly pure pyroxene rock. Some beds of apparently pure limestone are found to contain a large quantity of white pyroxene, and when this has altered to serpentine, as it tends to do, the white and green mottled, calcite serpentine rock known as ophicalcite results.

There is always found associated with the limestones a series of curious schists and gneisses, often found also where no limestone is present, which are difficult to describe, owing to their many phases, but which are easy of recognition and are as characteristic of the series as are the limestones. They vary from exceedingly quartzose to quite basic rocks. Garnet, graphite, sillimanite, pyrite and white pyroxene are very frequent and characteristic minerals. Many of the beds, specially those which contain pyrite, weather readily to a peculiar, rusty looking rock, seemingly much more altered than is actually the case. Many others are exceedingly quartzose, so much so as strongly to resemble quartzites, but these are found to contain usually much alkali feldspar, rocks that contain more than 75% of quartz being uncommon. Locally recrystallization has produced very coarse grained varieties of these rocks, the quartz appearing in large sheets and bunches. But such are usually interbanded with layers in which much pyroxene is associated with the quartz.

Garnet is often a very abundant mineral in these rocks, though more abundant in the more feldspathic varieties than in those purely quartzose. Graphite is more apt to appear in the rusty-weathering gneisses. In certain beds garnet becomes the predominant mineral, but these make small bulk in the series as a whole. Sillimanite is also found mainly in the quartzose gneisses, perhaps specially in those rich in garnet. At times it is only sparingly present as microscopic inclusions in the quartz, at other times it becomes quite abundant and is in larger needles.

In the more basic gneisses pyroxene is usually the most abundant dark mineral, though biotite and phlogopite micas are also frequent, some very micaceous bands occurring. Aside from frequent narrow bands of amphibolite, hornblende is a relatively rare mineral in the Grenville rocks. These amphibolites may be sedimentary, but seem to the writer more likely to represent original igneous dikes or sheets intruded into the series. Since, however, there is considerable variation in their appearance and make-up, they may be partly of one origin and partly of the other.

These Grenville rocks have the composition of sandstone, shales and limestones and their intergradations, and have a wholly different mineralogy from any known igneous rocks, whether metamorphosed or not. Under metamorphism they seem to have wholly recrystallized and to have been greatly stretched in one direction, giving rise to the foliation, and drawing out such igneous rocks as had been intruded into them into parallel bands with a foliation in common with them. The limestones were the most plastic of the beds under metamorphism, and, where the rocks have been most compressed, have often been so squeezed as to comport themselves much like igneous rocks, pressing into fractures in, and inclosing a number of fragments of, the more brittle inclosing rocks, producing combinations which have a strong external resemblance to conglomerates. To a minor degree the same sort of thing is shown in the gneisses, two adjacent bands of different brittleness showing the more brittle ruptured and the other squeezed into the break. This has often happened to the basic bands in the acid gneisses for example. On a yet smaller scale it is often shown among the various minerals of a single rock.

Along the eastern border of Franklin county, extending northward for a few miles from Franklin Falls, are considerable masses of a coarse, rusty brown rock which consists of little else than quartz and microperthite feldspar. The quartz is in flattened lenses or spindles up to an inch or two in length, all with the same orientation, and surrounded by a mosaic of microperthite. The belt adjoins a belt of Grenville rocks which includes limestones; and Kemp interprets the rock as a recrystallized and squeezed conglomerate.[1] While this view may be the correct one, it is desired to call attention to the fact that the belt is also in close association with a mass of augite-syenite belonging to the later eruptive series, that much of this rock possesses the same spindle quartz, and that much of it consists of little else than feldspar and quartz. The resemblance is so close that the writer's disposition has been to refer the rock to these syenites, as a somewhat aberrant member, and this alternative view is thought worthy of record.

In nearly all exposures of the Grenville rocks there is found an admixture of red, gray and black gneisses which have the composition of igneous rocks, granites, syenites, diorites and gabbros and are thought to be such in a much metamorphosed condition, though for the most part they have lost all trace of the structures and textures of such rocks and possess an evenly granular texture, due to thorough crushing or granulation of their minerals, accompanied by a certain amount of recrystallization. They now form red, orthoclase gneisses, amphibolites, and gray to black, granular gabbroic gneisses. They are usually so involved and interbanded with the sedimentaries as to appear bedded and like an integral part of the series. But their composition and character seem to point to the igneous origin of a large part, if not the whole, and they likely represent dikes, sheets and small intrusive masses, somewhat later than the sediments.

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[1] Am. Ass'n Adv. Sci. Proc. 49:169.

All these rocks are often cut by rusty looking amphibolite dikes which cut across the foliation, and represent somewhat later intrusions, likely of diabase, but so old and profoundly altered as to present little resemblance to the original rock except in composition.

These gneisses are further cut by yet later granites and gabbros, rocks which have not been so profoundly metamorphosed, but which still retain sufficient traces of their original structures as to render their origin certain. The finding of these is quite what should be expected, since all younger igneous rocks must have cut their way through these gneisses in working their way toward the surface.

At the present day the Grenville rocks are found in numerous long, narrow belts around the borders of the Adirondacks, but mostly only in small, disconnected patches in the heart of the region. The reasons for this will appear later, but in a word it seems due in large measure to the greater amount of erosion which the Precambric rocks have undergone in the latter situation. The belts are larger and more numerous on the south and west sides, and are infrequent on the north, except at the extreme northwest. Kemp has emphasized the greater abundance of limestone in the belts on the west and the greater quantity of quartzose gneisses on the east. In the large way this is the case, though both rocks are found in each locality. Both are also found in the scattered patches which extend through the heart of the region.

The base and summit of the Grenville are both unknown, and the thickness of the series is therefore purely a matter of guesswork. The rocks were deposited all over the region, but erosion has removed all but the present belts and patches. The lack of summit to the series is therefore what would naturally be expected, and it may be legitimately argued that the thickness must have been very great, since so great an amount of rock has been worn away. It is by no means meant to imply that these rocks formed the whole mass of what has been removed, but it is thought that they must have constituted a respectable percentage of it. Even the remaining fragments indicate a very considerable thickness for the formation.

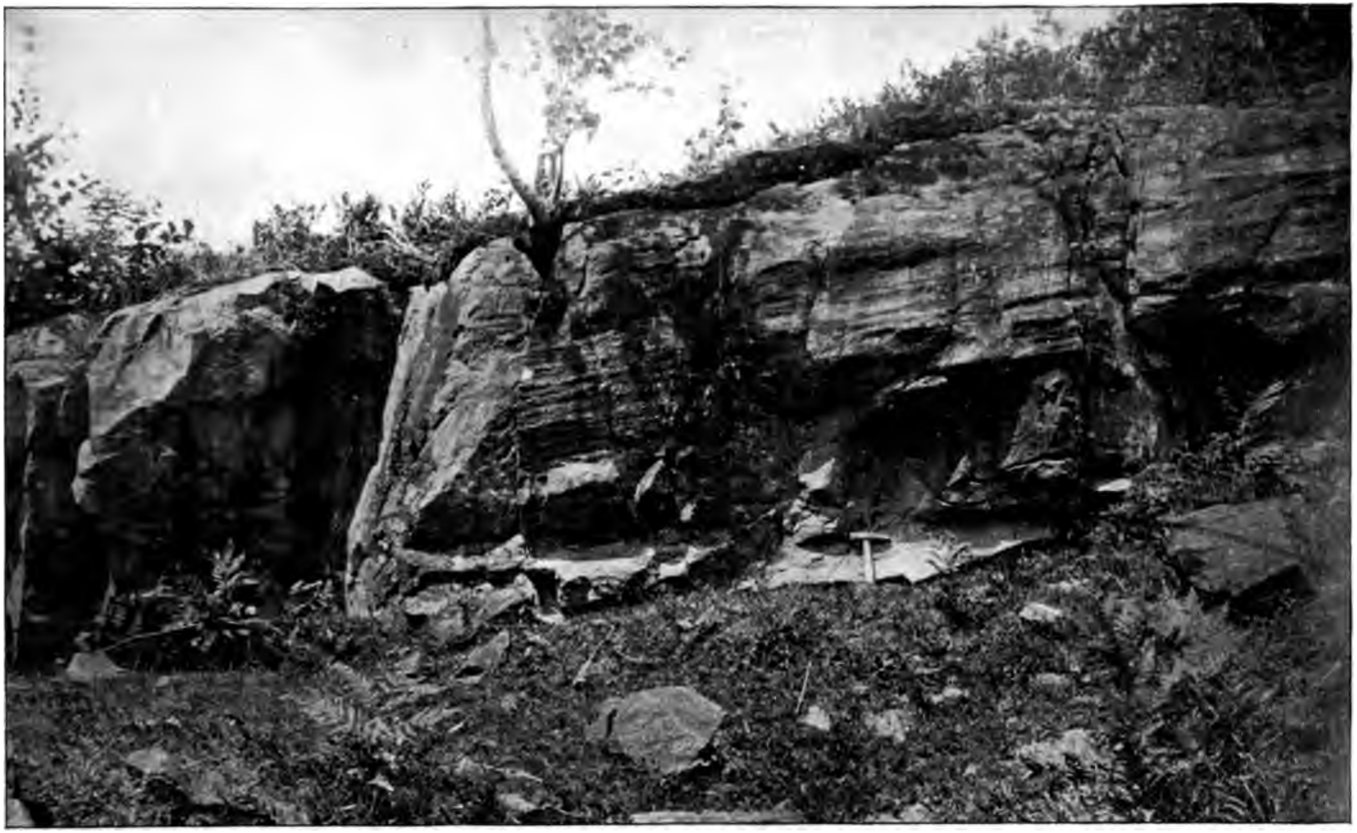
The nondiscovery of the base is not so easily accounted for. It is a water-deposited formation and must have been laid down on some floor, and it would naturally be expected that some evidence of what this floor was would be forthcoming. But the great metamorphism which has destroyed the old rock structures and given them a common foliation, the inextricable intermingling of igneous rocks with the Grenville sediments, and the later great igneous invasions from beneath have so disguised the rock relationships as to make it very likely that the base of the Grenville will never be satisfactorily made out in the region.

**Doubtful gneisses ("Saranac" formation).** In the portions of the Adirondack region with which the writer is familiar the only large body of gneiss which is practically free from all Grenville admixture and at the same time seems to have no connection with the later igneous intrusions, is found in a belt running through northern Clinton and Franklin counties, adjoining the Potsdam boundary. It is not utterly free from Grenville rocks, since a few small patches of these do occur, though unfortunately exposures which disclose the relations between the two nowhere appear. The presence of these few small patches in the great body of gneiss furnishes one of the main arguments for the distinction between the two, since it is unlikely that the distinctive Grenville rocks would be present in such slight quantity were the gneisses affiliated with them, that is, were either sediments or were igneous rocks of Grenville age.

These gneisses are prevailingly red, acid gneisses whose usual feldspar is orthoclase (or microperthite or microcline), and which have the composition of granites. They vary much in coarseness from place to place and from band to band, ranging from finely and evenly granular varieties (which are the prevailing ones) to those which are quite coarsely crystalline. An alkali feldspar (microperthite, microcline or orthoclase in order of abundance) and quartz are the prevailing minerals, magnetite is always present, and usually hornblende in small amount as well. Biotite sometimes occurs instead of hornblende or together with it. The coarser gneisses often show traces of cataclastic structure, larger individuals, usually of feldspar, being surrounded by a granular mosaic which seems to have resulted, at least in part, from the crushing of the larger individuals. The fine grained varieties have the character of this mosaic throughout, the larger individuals being absent, so that, though they are likely akin to the coarser rocks, being simply more thoroughly granulated representatives, due perhaps to original finer grain, it is impossible to be certain that this is the case.

Along with these red gneisses, often interbanded with them with seeming regularity, often found in large masses, are two other kinds of gneiss of common occurrence. Like the red gneiss, they show many variations in composition and appearance, and also show a rude foliation, usually parallel to the banding. The more abundant sort is usually gray in color and consists essentially of pyroxene and feldspar, both plagioclase and orthoclase. The pyroxene may be either augite or hypersthene (or enstatite), or both, augite being the more frequent. The usual augite is a deep emerald green and shows pleochroism from green to yellow green, resembling aegirine augite. Magnetite is always present and sometimes a little hornblende and biotite as well. Either orthoclase or plagioclase may be in excess and either may be present to the exclusion of the other. The plagioclase is usually oligoclase but sometimes andesin. These rocks usually show an evenly granulated or granulitic structure quite like that of the fine grained red gneisses, but how much this is due to granulation, or to recrystallization, or may even be original, can not be determined.

Plate 1



Contact of gneiss and granite near Duane

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The other gneisses are black and consist essentially of feldspar and hornblende, with or without pyroxene, in other words, they are amphibolites. They have often a massive appearance and are in general more abundant where the gray gneisses are scarce or absent. The feldspar may be plagioclase or orthoclase or both, but the former much predominates, and is usually andesin or oligoclase. Pyroxene seldom equals the hornblende in quantity and is often absent. The rocks seldom show any traces of crushing but seem to have largely recrystallized.

These rocks often occur in thick bands or masses, often in thinner masses interbanded with red gneiss, and very similar rocks are often found in thin bands or bunches in the red gneiss. The latter may be either segregations or inclusions, it being usually impossible to determine which. Very similar rocks are also found as dikes cutting the red gneiss. These usually have a more rusty appearance than the ordinary rock and may be either offshoots from it or may represent a different and later rock.

These amphibolites are often found involved with red, granitic gneisses which cut them intrusively, both cutting across the foliation and sending a multitude of thin sheets into the amphibolite along the foliation planes, producing a red and black gneiss [pl. 1]. In such case the amphibolite is clearly the older, but in all such the question arises whether the granite is merely a phase of the ordinary red gneiss, or whether it is a different and younger rock. Since in nearly all cases these granites are not so foliated as the red gneiss, but retain distinct traces of igneous textures, often abundantly, it is thought that they are likely younger and not to be classed with it. Among other localities such granites are widely shown around St Regis Falls in Franklin county.

Nearly all, if not all, of these doubtful gneisses seem to have the composition of igneous rocks, though the question can not be fully decided without a large amount of chemical work. The gray gneisses are perhaps the most questionable in this respect. There is a range in composition from granites through syenites and diorites to gabbros, all intermediate gradations appearing. If there be any rocks exposed in the region which are older than the Grenville rocks, they are found here. Unmixed with Grenville rocks, they extend along the Potsdam boundary on the north side of the Adirondacks for a distance of 70 miles. Nowhere else in the region is a belt of such length known, though there may prove to be one of even greater dimensions in the little studied southwestern area. Smyth has shown that a great, unbroken extent of gneisses occurs there, but these may prove in large part to belong with the later intrusions. Grenville gneisses may be also found more abundantly than yet appears, when the region is covered in more detail. Such gneisses are abundant north from Little Falls, though no limestones occur.

These gneisses present just such an igneous complex as is found in all parts of the earth's surface where these very old rocks are exposed, which are thought by many to represent the original cooled crust of the earth, or rather its downward extension. There is much to be said in favor of this view, though it can by no means be held to be fully established. The main difficulty of its adoption so far as these special rocks are concerned is that very similar, or identical, gneisses are found either interbanded with the Grenville rocks or else cutting them intrusively, as has already been noted. If the two are not identical, it should be possible to demonstrate differences between them, and the future may show this possibility. If they are identical, the only possible way in which they could represent the floor on which the Grenville rocks were laid down would be to hold that in many places, after the deposition of the Grenville rocks, these underlying rocks had been rendered plastic by heat and compression and had thus comported themselves as igneous rocks. The difficulties against this view are great, and the whole question is a most perplexing one.

To the northward in Canada there are great stretches of country occupied by similar rocks, and the name " Ottawa gneiss " is there given to the formation. Uncertainty as to the equivalency of the two led the writer, some years since, to propose the name "Dannemora formation," from Dannemora mountain in Clinton county for these gneisses of the northern Adirondacks, the name to serve unless equivalency with the Ottawa gneiss can be shown, in which case that name should be adopted. Since, however, possible confusion with a noted Scandinavian locality may result, the name Saranac formation is suggested to replace it. The rocks are well exposed along the river of that name, in Clinton county, and in its near vicinity.

**Anorthosite.** This was the first of the somewhat later, great igneous intrusions which invaded the rocks already described from below, breaking them up, pushing them aside or raising them on its back, and inclosing great horses of them in many places. The fact that it has not been so excessively metamorphosed as the previous rocks is indicative that it is considerably younger than they, as is the further fact that its character indicates that it solidified at considerable depth, and that therefore the Grenville sediments must have become buried under a considerable thickness of later deposits, since worn away, before the intrusion took place.

The Adirondack anorthosite is found principally in one great connected mass, seemingly one single intrusion, though this may not be the case, occupying a great area in Essex and southern Franklin counties, of rudely triangular shape with indented base and blunted apex, the base at the north. The base is some 55 miles across, and the hight of the triangle some 40 miles, the area of country involved being some 1200 square miles at a rude approximation. Occasional small areas of other rocks, in part Grenville or doubtful gneisses, in part later intrusives, are found within it, but, mostly, it extends unbroken throughout. The inclusions, or horses, of various gneisses are most numerous near the borders of the mass, and some great tongues of the outlying rocks project into it. There are also a few outlying masses, mostly of very small size, the Rand hill mass in Clinton county, which has an area of some 4 square miles, being perhaps as large as any. These may represent independent smaller intrusions, but more likely are simply outliers of the main mass, connected with it not far underground. The present areal distribution of the rock merely gives its extent in the plane in which the present erosion surface cuts it. Since this surface is irregular, we have some slight idea of the thickness of the mass, the higher mountain peaks furnishing vertical sections of over 3000 feet. But the amount which has already been removed by erosion can be but vaguely estimated, and the extent of the mass in depth is wholly problematic. Any estimates of the original bulk of the mass can be nothing but pure conjectures, except that it can safely be said that it was vast.

*Mineralogy.* These rocks are composed mainly, and sometimes wholly, of basic plagioclase feldspar, usually labradorite but sometimes bytownite or anorthite. They are eruptives of the gabbro family extra rich in feldspar, which forms from 90% to 100% of the whole rock throughout most of its extent. The minerals next in abundance are augite and ilmenite (or titaniferous magnetite), followed by hypersthene. Minute apatites are usually present. In the many differing phases which the rock presents, several other minerals creep in, the more common of which are hornblende, biotite, garnet, microperthite, quartz, oligoclase and a sulfuret, either pyrite, chalcopyrite or pyrrhotite. These are the original minerals of the rock except where they are due to recrystallization consequent on metamorphism. Subsequent alteration has locally produced other minerals, notably zoisite, epidote, chlorite, scapolite and muscovite, and surface decay has formed yet others.

The feldspar is usually labradorite, twinning striations showing plainly on fresh cleavage surfaces. The thin section usually shows it to be full of minute, rodlike inclusions, all with parallel arrangement, of some opaque mineral, likely ilmenite. These are likely responsible for the usual dark blue color of the mineral, and probably for the occasional iridescence, in greenish blue colors, as well. This is by no means so frequent or so well displayed as in the Labrador and Norway anorthosites, but is a common phenomenon in the region.

The other minerals call for no special comment. An augite which is light green in thin section, is next in abundance to the feldspar. Orthorhombic pyroxene is in general not so prominent. It is usually hypersthene but sometimes bronzite. Ilmenite always occurs with these, but in the normal anorthosite all these are in small quantity, constituting ordinarily less than 5% of the rock.

*Texture.* The original anorthosite must have been extremely coarsely crystalline, and likely coarsely porphyritic. Under metamorphism the rock has been granulated in varying degree, here but little, leaving the rock still very coarsely crystalline, there excessively, producing a finely granular rook, all intermediate gradations between the two being found. In the coarser rocks the large feldspars are often from 2 to 5 inches in length and are universally dark colored, often showing straining and bending as a result of metamorphism. The granular feldspar is lighter colored and in thin section does not show the opaque rods which characterize the other. It has plainly originated from the crushing, in whole or part, of the large feldspars, crushing under such great load of overlying materials as to cause the rock to remain firm and resistant during the entire process; in fact, the granulated rock is often stronger than the other.[1]

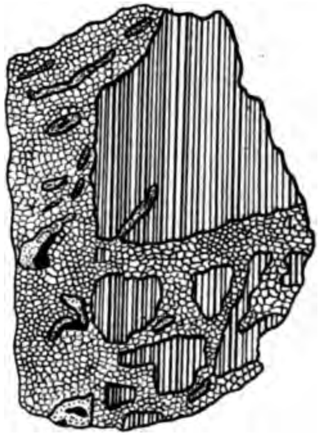

Fig. 1 Drawing of a portion of a hand specimen of anorthosite gabbro from near Keeseville, showing a large labradorite crystal which has been broken into several pieces, these being forced apart and granulated around their edges and the gaps filled by granulated material, the rock remaining firm and tough throughout. The black mineral is ilmenite, and the dotted is granular garnet. The uniform cleavage and twinning of the fragments of the large crystal demonstrate their identity.

*Differentiation.* As the borders of the anorthosite are approached, the rock invariably shows some variation in character, the usual one being that the pyroxenes and ilmenite increase in amount and come to constitute from 15% to 35% of the rock, which thus tends to approach gabbro in character. It is, however, much too feldspathic for normal gabbro and may well be called anorthosite gabbro, since it represents a distinct intermediate stage. With this mineralogic change there is always found an accompanying change in texture, the rock becoming always less coarsely crystalline, the big feldspars diminishing in both number and size and the amount of granular mosaic increasing. The rock also becomes more gneissoid. In this phase garnet is sure to creep in, often in considerable quantity. It develops in the main at the contacts between ilmenite and feldspar, the one furnishing the iron, and the other the lime, alumina and silica which enter into its formation. Garnets may form in this way, either during the original cooling of the rock or owing to subsequent metamorphism, and it is usually impossible to say, in these anorthosites, whether they are to be referred to the one or the other, or to both methods of formation.

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[1] For detailed descriptions of these textures, see Adams, F. D. Geol. Sur. *Can. An. Rep't. v.8. pt J.* p.108–15.

It is not meant to imply that changes of this sort occur only as the edge of the mass is neared, but rather to point out that they do uniformly occur under those conditions. But the same rock is often produced well within the anorthosite mass by local differentiation. It is in fact but a more extreme differentiation of the same sort that gives rise to the local development of great masses of titaniferous magnetite such as occur about Lake Sanford in Essex county and have been described in detail by Kemp.[1]

This anorthosite gabbro forms the greater part of the boundary of the Franklin county portion of the anorthosite mass. But on the south a yet greater change takes place, and the anorthosite gabbro passes over into a dark colored gabbro gneiss. This rock has not yet been seen in fresh condition, and hence has not received the thorough investigation that its interest and importance demand. The change is of the same sort as that involved in the passage of anorthosite into anorthosite gabbro, but is more extreme. As has been seen, that consists (1) in a change in composition due to increasing amount of pyroxenes and ilmenite with corresponding diminution of feldspar and the appearance of garnet in quantity; (2) in a change in texture, the rock becoming less coarsely crystalline and the large feldspars diminishing in frequency and size, with increase in the amount of granulated material; and (3) in the rock becoming more prominently foliated with concentration of the dark minerals along the cleavage planes. In this further change the dark minerals come to form 50% or more of the rock; the large feldspars become constantly smaller and less frequent up to complete disappearance; and the rock becomes eventually a finely granular, well foliated, dark gneiss. The change from the anorthosite into this rock is gradual, and the relationship unmistakable; yet to an observer first coming on the rock from without the anorthosite area, such a relationship would seem most improbable. This gneiss is just as clearly a border differentiation product of the anorthosite gabbro as that is of the anorthosite, a differentiation produced in the molten mass after it had reached its present resting place and while cooling. It is however impossible to say why this further differentiation has taken place only on this one side of the mass instead of rather uniformly about the whole, as is the case with the anorthosite gabbro.

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[1] *U. S. Geol.* Sur. 19th An. Rep't, pt 3, p.383–422.

*Surrounding rocks.* The Franklin county anorthosite is bordered by all sorts of rocks, both Grenville and doubtful gneisses and later igneous rocks. That it is younger than the Grenville and some of the doubtful gneisses is definitely established by (1) the fact that masses of varying size are found inclosed in the anorthosite; (2) by the fact that the few contacts exposed show the anorthosite cutting them and sending tongues into them; and (3) by the fact that, where no contacts are exposed, the anorthosite can be shown to cut out the other rocks along their strike. The later date of certain igneous rocks, shortly to be described, is mainly deduced from the finding of dikes of what are thought to be identical rocks which cut the anorthosite. So far as the actual dikes are concerned, there can be no question of their later date; the uncertainty connected with the matter arises from the fact that in no case has it so far been possible to trace these dikes to any connection with the near-by larger masses, of which they are thought to represent offshoots, so that the correlation between the two depends merely on rock similarity. At the one or two exposed contacts it seems quite certain that the anorthosite is the older rock, but here again there is some question as to the actual identity of the rock which cuts it.

At two localities near the anorthosite boundary, border rocks have been discovered which, instead of exhibiting the ordinary change to anorthosite gabbro, disclose a gradation toward syenite. Such have only been noted in localities where the anorthosite is bordered by a syenite which is thought to be younger, and the rock represents a transition stage between the two, though much closer to anorthosite than to syenite. The precise significance of these rocks is not known, the field exposures not being sufficient to give any idea of the relationships to the two rocks, and, since the presence of an intermediate rock of this sort can be accounted for in several ways, and gives no evidence as to the relative age of the other rocks, speculation on the subject is of no value, in the lack of corroborative field evidence.

**Anorthosite outliers.** In the northern Adirondacks there are two considerable anorthosite outliers in Clinton county and two very small ones in Franklin county. Not unlikely other small ones will be discovered when the region is mapped in detail, work of this sort on the Long Lake sheet of the new topographic maps during the past season having first brought to light the two Franklin county outliers mentioned above. Kemp has mapped several on the south in Essex and Warren counties.

The two Clinton county outliers are those at Keeseville and Rand hill. The former is not strictly an outlier but rather a tonguelike offshoot from the main mass, the connection being bared by erosion. As in all the outliers, the rock here exhibits the characters of the border portions of the main mass rather than of its center, in other words is anorthosite gabbro, not so coarse grained as, but more gneissoid than the usual rock, with from

10% to 25% of minerals other than feldspar. Much of it is very gneissoid and finely granular, with great development of garnet. Elsewhere it becomes tolerably coarse with frequent, often very large feldspars remaining. It varies very rapidly in character from place to place, so that practically all varieties of the rock may be collected within a small area. This, together with the accessibility of the locality and the frequent exposures, make it a magnificent collecting ground.

The Rand hill rock departs somewhat from the ordinary type and is a most interesting rock. It is mostly thoroughly gneissoid and with no feldspar augen, these only appearing in quantity at the northern edge of the exposures. Since this is the more likely condition of the central part of the mass, and since further exposures in this direction are cut off by the overlying Potsdam sandstone, it is probable that the rock extends considerably farther northward under the Potsdam covering.

The most important difference between this rock and the usual anorthosite gabbro consists in the constant presence of quartz in considerable amount, forming from 5% to 10% of the rock. Another difference is found in the comparatively large amount of apatite present, the average of the rock holding from 3% to 5% of this mineral and the amount not infrequently rising to 10%. Aside from these the minerals are those of the usual anorthosite gabbro, though the minerals other than labradorite form from 30% to 35% of the rock.

The primary minerals which have been noted in the rock are feldspar (usually labradorite), augite, quartz, hornblende, hypersthene, apatite, ilmenite, zircon, pyrite, pyrrhotite and titanite. Secondary minerals are garnet, hornblende, biotite and quartz. There are other minerals present which have resulted from surface alteration of the foregoing, but they are the usual decomposition products formed under such circumstances. The order of crystallization was the usual one, first the zircon and apatite followed by the iron ores, then the hypersthene, augite and hornblende, then the feldspar and finally the quartz. The periods of formation of the pyroxenes and feldspar largely overlap. Augite is much more abundant than hypersthene. There is great variation in the relative amounts of augite and primary hornblende, and sometimes the latter preponderates.[1]

The two outliers in Franklin county are very small, each only a few square rods in extent. The one is about 6, the other some 8 miles distant from the edge of the main mass. Considering their small size, they are rather surprisingly coarse, that is, on the hypothesis that they were intruded into the surrounding rocks, yet much of the rock is very gneissoid. In the one case the surrounding rocks are thought to be later eruptives, the observed contacts seeming to bear out that view, so that the anorthosite is in the nature of a huge inclusion in these eruptives. But there are some difficulties in the way of this interpretation, and, till the material is more thoroughly studied, it can not be positively stated that it is the true one.

About the other outlier there are no exposed contacts with the surrounding rocks, which are gneisses of uncertain nature and origin, and the relations between the two are wholly uncertain.

At Rand hill magnificent contacts of the anorthosite gabbro with gneisses thought to belong to the Dannemora formation, are shown and definitely prove the anorthosite to be the younger rock.

**Whiteface type of anorthosite.** This name has been proposed by Professor Kemp for a peculiar type of rock, rather uncommon in the Adirondack region, which reaches a considerable development on, and in the vicinity of, Mt Whiteface. The main mass of the rock is in Essex county, but it gets over the border into Franklin at Franklin Falls, and into Clinton county on Wilmington and Catamount mountains. In both of these situations it becomes much involved with other rocks, and about Franklin Falls it often appears so interbanded with Grenville rocks as to seem like an integral part of the series.

The rock has the mineralogy of anorthosite, or rather of anorthosite gabbro, though quite a different-looking rock from the ordinary types. It is mostly quite thoroughly gneissoid and characterized by the color of the feldspar, which is milky white, even when perfectly fresh and unaltered. In the writer's experience with the ordinary Adirondack anorthosites, white feldspar is rare and where occurring is due to local alteration, which is distinctly not the case in these "Whiteface" rocks. These are also much richer in hornblende and pyroxene than the ordinary anorthosites, though nearly pure feldspathic types have some small local development, as for example near the bridge at Franklin Falls. They differ also in the prevailing very gneissoid character, but occasional feldspar augen do occur and sometimes reach considerable number and size. A single hand specimen of the feldspathic rock from Franklin Falls which lies before me, shows three such augen which are more than an inch in length, besides several smaller ones. The structure is plainly cataclastic in these less gneissoid types.

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[1] For a more detailed description of this rock, *see* 19th An. Rep't N. Y. State Geol. p.r52–r59.

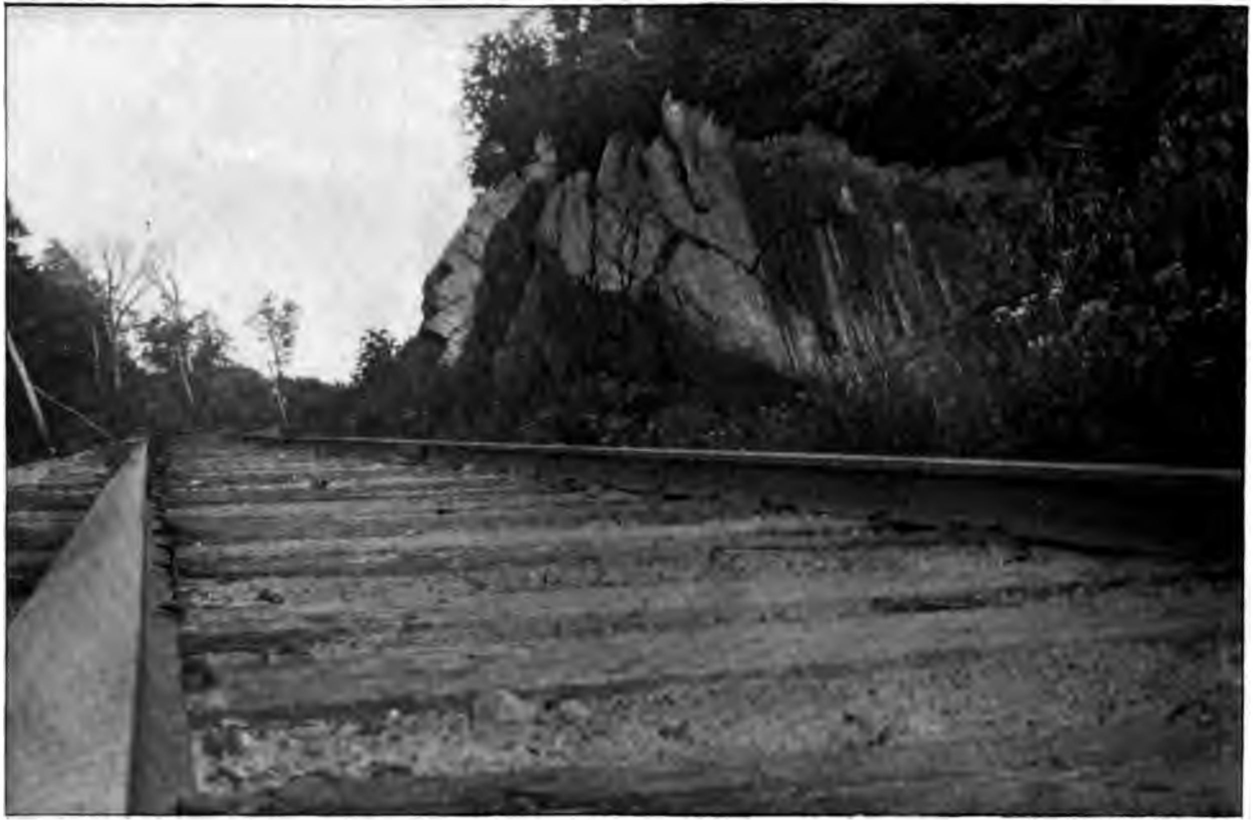
The slides from the Clinton and Franklin county rocks show a general predominance of hornblende over pyroxene, though both occur in considerable amount. The pyroxene is a deep green augite, no hypersthene having been noted. The feldspar is mostly labradorite, as indicated by maximum extinctions of from 22° to 27° in the different slides. They show marked strain phenomena, such as undulatory extinction, bent twinning lamellae, and wedge-shaped or pinched out twinning lamellae. There is always some untwinned feldspar present, which is however thought to be labradorite. The accompanying minerals are the same as in the usual anorthosite, iron ores, zircon, apatite, titanite, garnet, and sometimes a little quartz, usually as a by-product of the garnet formation. The mineralogy of the rock, the local cataclastic structure, and the fact that it occurs in a considerable mass, surrounded on all sides by other rocks, seem to point to its igneous nature. The apparent interbanding with Grenville rocks at the edge of the mass gives that portion a sedimentary look, but all the other igneous rocks of the district show similar phenomena at their borders, and it would seem that the clues to the origin of these rocks must be sought in the least changed, most massive portions, rather than in their peripheral phases where metamorphism has been most excessive. The rock is therefore regarded as igneous and as belonging to the later intrusives. Its localized distribution would seem to indicate that it represents a separate intrusion rather than a local peculiar phase of the general anorthosite mass, but, so far as the writer is aware, no definite evidence has been forthcoming concerning the time relations of the two rocks.

**The syenites.** In many parts of the Adirondack region there are found considerable areas of igneous rocks of greenish gray color and fairly uniform character, which have considerable resemblance to some phases of the anorthosite and were till comparatively recently confounded with them. In their normal phases they are readily recognized, but they show variation both in composition and in degree of foliation, giving rise to varieties from one or both of these causes which are difficult of recognition. Originally they possessed nothing like the coarsely crystalline character of the anorthosites and hence, even where least metamorphosed, the amount of granulated material is very large, and the uncrushed feldspar remnants are infrequent and of small size. Like the anorthosite, they become finer-grained and more gneissoid near their borders, passing over into granular gneisses; and these become intricately involved with the bordering rocks, the whole forming a tangled complex which is exceedingly difficult to unravel.

Though grayish green on freshly fractured surfaces, these rocks undergo rapid color changes on exposure, so that the normal color is only to be seen in recent rock cuts. On slight exposure it changes to a more pronounced green, then passes over to a yellowish or brownish green, and longer exposure changes the whole mass to a rusty brown [pl. 2]. Even freshly stripped, glaciated surfaces show the latter color, though in them it is often only skin deep. In the majority of exposures only the rusty brown rock can be collected, though residual green spots may often be noted. The cause of the color changes is not manifest, thin sections of specimens of all the varieties except the rusty brown showing all the constituent minerals in perfectly fresh condition; and even the latter is often so fresh as to show little alteration in any of the minerals except the hypersthene.

These rocks are predominantly feldspathic though not so markedly so as are the anorthosites. Because of their original finer grain, they are mostly quite gneissoid, and feldspar augen

**Plate 2**



Railroad cut in augite-syenite ½ mile south of Loon Lake depot. The dark portion is fresh and of green color; the lighter portion is somewhat weathered and is brown

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are practically absent over considerable areas, and, where they do occur, are mostly few and small. Yet such rocks are repeatedly found shading locally into others with much less apparent gneissoid structure, with feldspar augen quite frequent and with definite cataclastic structure; rocks whose original igneous textures are sufficiently well preserved to show their origin beyond a doubt.

In some cases, notably at Little Falls and Middleville in Herkimer county, where outliers of these rocks occur and where the augen are bigger and more numerous than at any other known localities, the rock seems to have originally been rather coarsely porphyritic. But for most of the rock in the region this does not seem to have been true.

*Mineral composition.* At the type locality, Loon lake, the rock is a quartzose augite syenite, and, since this is the prevailing character over much of the region, the description of the type will serve well for a general description of the rock.

In the Loon lake rock microperthite and oligoclase feldspars, augite and hypersthene (or bronzite), hornblende, magnetite, quartz, garnet, apatite and zircon are always present, and locally biotite, titanite, pyrite and allanite appear in addition. The rock is essentially composed of microperthite, augite and hypersthene, with quartz, oligoclase and garnet always present in varying and usually slight amount.

The feldspar is mostly microperthite. A little plagioclase always appears and seems universally to be oligoclase. Most of the plagioclase present is intergrown with orthoclase in the microperthite, and the chemical analysis indicates that this must be albite. The feldspar is usually perfectly fresh and contains to some extent minute, dustlike inclusions, as well as including small zircons, apatites and titanites and occasionally small augites and quartzes also. Orthoclase is only present as a constituent of the microperthite.

Both augite and hypersthene are usually present, the former mostly predominating. Parallel growths of the two frequently occur, often of repeated fine lamellae, the contact faces being as usual. The augite is deep green in thin section, quite like the green of the hypersthene.

Garnet occurs only sporadically and then always corrosion zone fashion, between the magnetite and feldspar. But little hornblende is found in the Loon lake rock.

In the type rock quartz occurs only sparingly, though quite quartzose varieties occur in the immediate vicinity. It is mainly in rather coarse, elongated spindles or lenses. It is also found as small inclusions in the feldspar, sometimes rather numerously and with a tendency to the production of micrographic growths.

The rock has a cataclastic structure, ranging from rather coarse varieties to those which are thoroughly gneissoid, and the granulation pretty complete. In other words, it shows the same variations in texture which the anorthosites exhibit, except for the lack of the very coarse varieties.[1]

*Variability of the syenite.* While this description will answer for the usual rock in many places, it shows great variability. On the one hand, the amount of quartz varies widely, rocks which contain as much as 20% of it being not at all uncommon. Increase in quartz is commonly accompanied by decrease in the amount of pyroxene and hornblende present, and hence by disappearance of well marked foliation, it being replaced by a linear structure due to the spindle form of the quartzes and their parallel alinement. This structure is quite characteristic of some of the igneous rocks of the region. This quartzose variety is usually coarsely granular and seems to weather even more rapidly than the ordinary rock, so that it is very difficult to obtain in fresh condition, and usually only the rusty brown rock can be found. It is the great similarity of this variety, which can be traced into the normal rock through all gradations, to the brown, quartzose gneiss north of Franklin Falls which Kemp regards as a possible Grenville conglomerate and which has already been referred to, that causes the writer's hesitation in accepting that origin for the rock. It may be also added that, whereas this Franklin Falls rock is adjoined by Grenville sediments on one side, it is also adjoined by augite syenite on the other, so that areally the connection with one sort of rock is no closer than with the other.

Another common variation in the rock is brought about by changes in the relative amounts of pyroxene and hornblende. In the ordinary rocks the pyroxenes much predominate, but these shade into rocks in which the reverse is true, the hornblende increasing up to complete exclusion of the pyroxenes. With this increase in hornblende biotite always appears in the rock, this mineral being usually lacking in the pyroxenic varieties. Further, the more quartzose varieties are more apt to be those with predominating hornblende, though this is by no means a general rule.

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[1] For a more detailed description of these rocks, see Geol. Soc. Am. Bul. 10:177-82.

*Extreme variations.* Besides these minor changes in character, more extreme variations of these rocks occur, on the one hand into granitic, on the other into gabbroic rocks, variations which can however be traced into the ordinary rock step by step.

The most striking instance of a change of this sort which has received careful description is found in Smyth's account of the Diana syenite belt.[1] At the time when this paper was written the syenites had not been differentiated from the anorthosites and gabbros, and the rock was described as a variety of gabbro, and its variations as variations of a gabbro mass. Smyth's description, however, shows that he clearly apprehended the differences between the rock and ordinary gabbro, and he distinctly states its syenitic character, and moreover in a later publication wholly withdraws the rock from the gabbro class.[2] Unfortunately this has not been apprehended by the several writers who have had occasion to refer to this important paper, and the special variation into a red gneiss which will be shortly described is referred to as a variation of gabbro into red gneiss. The truth is that no such variation of gabbro is known in the region, while variations of the syenite into red, granitic gneisses are the rule rather than the exception.

The special interest attaching to this Diana syenite arises from the clearly exhibited differentiation of the gray, feldspathic syenite into a dark colored rock of gabbroic appearance. The minerals are the same in both and are practically the same as in the Loon lake rock, but the pyroxene and hornblende are in much larger quantity in the dark rock, constituting from one third to one half of the whole, while they appear in but scant amount in the ordinary syenite at Diana. At the same time plagioclase increases in amount at the expense of the microperthite, and quartz diminishes, but it does not disappear, and the plagioclase remains acid, albite to oligoclase, instead of the labradorite of the gabbros. The affiliations of the rock therefore remain with the syenite, and it does not become a true gabbro. Chemical investigation brings out the same features, as will be later shown.

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[1] Geol. Soc. Am. Bul. 6:271–88.

[2] N. Y. State Geol. 17th An. Rep't. p.472.

Of equal interest is the passage of this syenite into a red gneiss. In one direction the passage is into a finely granular red gneiss, which Smyth states to differ from the main rock only in a more complete granulation of the constituents, the formation of a little hematite, which causes the color change to red, and an increase in the amount of quartz. In another direction the transition is into a coarser red gneiss which contains a conspicuous amount of hornblende.

Besides these important evidences of great variation in the syenite mass, the Diana area is noteworthy in yet another respect. It borders a long belt of Grenville rocks for several miles; and Smyth has presented in great detail the perfectly clear evidence that it cuts the Grenville rocks intrusively, since it contains abundant inclusions of them, and since it cuts them out along the strike.[1] These relations are here shown in greater perfection than in any other locality so far described in the Adirondack region, and seem to the writer to show not only that the syenite is younger than the Grenville rocks, but also that it is considerably younger. The less severe metamorphism which it has suffered, as evinced by the considerable extent to which it retains original textures which definitely show its igneous character, when compared with the completely crushed and recrystallized condition of the Grenville sediments and associated igneous gneisses, as well as with much of the Saranac gneiss, would seem to demonstrate this clearly, and to show that, so far as age is concerned, their condition of metamorphism would require their classification with the anorthosites, rather than with the Grenville and Dannemora rocks.

*Other syenite areas.* So far as the Adirondack region has been studied, these syenites seem to be more abundant and important rocks in Franklin county than elsewhere, though it is possible that future work will show that this is not the case. There are several considerable masses of the rock in this county, the chief ones being the Loon lake, Tupper lake, Saranac river, Duane and Salmon river areas. They all show very similar rocks, and all run into mixed rocks at their boundaries, that is, gneisses which seem referable to the syenite are inextricably involved with other rocks of all sorts, so much so as utterly to defy mapping except on an unwarrantably large scale. The Saranac river mass gets over the border into Essex county, and there are some small masses of the rock in Clinton county, notably in Black Brook township. Kemp has noted the presence of much similar rock in Essex, Warren and Washington counties, though here usually very gneissoid and so much involved with other rocks as to render it somewhat uncertain whether it is of the same age as the Franklin rocks or not. Undoubtedly much of the rock will be found in Hamilton and Herkimer counties when these shall have been more carefully investigated. The work of both Kemp and Smyth in these counties indicates the presence of a considerable quantity of this rock, though mostly in small masses, so that the gneissoid border phases, involved with other gneisses, are the usual types found.

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[1] 17th An. Rep't State Geol. p.474–81.

Special reference may be made to the Little Falls syenite in Herkimer. The coarse syenite of the Precambric outliers at Little Falls and Middleville is very similar and wholly uncontaminated with other rocks except for a few cutting dikes. They seem quite certainly parts of the same mass whose extent is concealed by the rocks of the Paleozoic cover. To the northward is a large area of a very gneissoid syenite, much involved with other gneisses mostly of Grenville age, so much so as to defy attempts to fix the relationships of the two, but forming a complex very like that around many of the belts.

A further special interest attaching to the Little Falls syenite arises from its plainly shown gradation into a gabbroic-looking rock which is very similar to the corresponding rock at Diana and represents a variation of precisely the same sort.[1]

In one of the cuts at Loon lake is an apparent inclusion of Grenville rocks in the syenite, which is by no means so decisive as to the age relations as are the Diana exposures, but which nevertheless presents some interesting features, as indicated by the accompanying section [fig. 2]. The augite syenite constitutes the center and south end of the section. It is more thoroughly granular and gneissoid than in the neighboring exposures. Separating the two syenite areas is a mass of banded gneiss 12 feet in thickness [pl. 3]. Above is a 2 foot layer of a white, granular rock composed of quartz and white pyroxene in the proportion of 1 to 2. This is followed by layers of black pyroxene granulite and light colored quartzose rocks, the latter consisting essentially of quartz and alkali feldspars in the proportions of 2 to 1. The structure and composition indicate the sedimentary origin, and identical gneisses are found elsewhere in intimate association with limestones. The section is cut at but a small angle with the strike, and but one of the contacts is exposed. This is parallel to the foliation and bedding and appears like a shear zone, marked by abundant development of biotite. Beyond this middle mass of syenite fine grained, red, granitic gneisses come in, which are likely igneous but quite like rocks often closely associated with the Grenville. The contacts of this rock with the syenite are not exposed. All the rocks have a common foliation, which is also parallel to the banding of the banded gneiss.

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[1] For details *see* N. Y. State Geol. 20th An. Rep't. p.r85–r92.

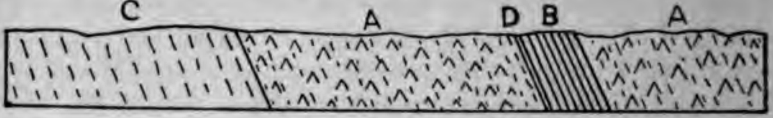
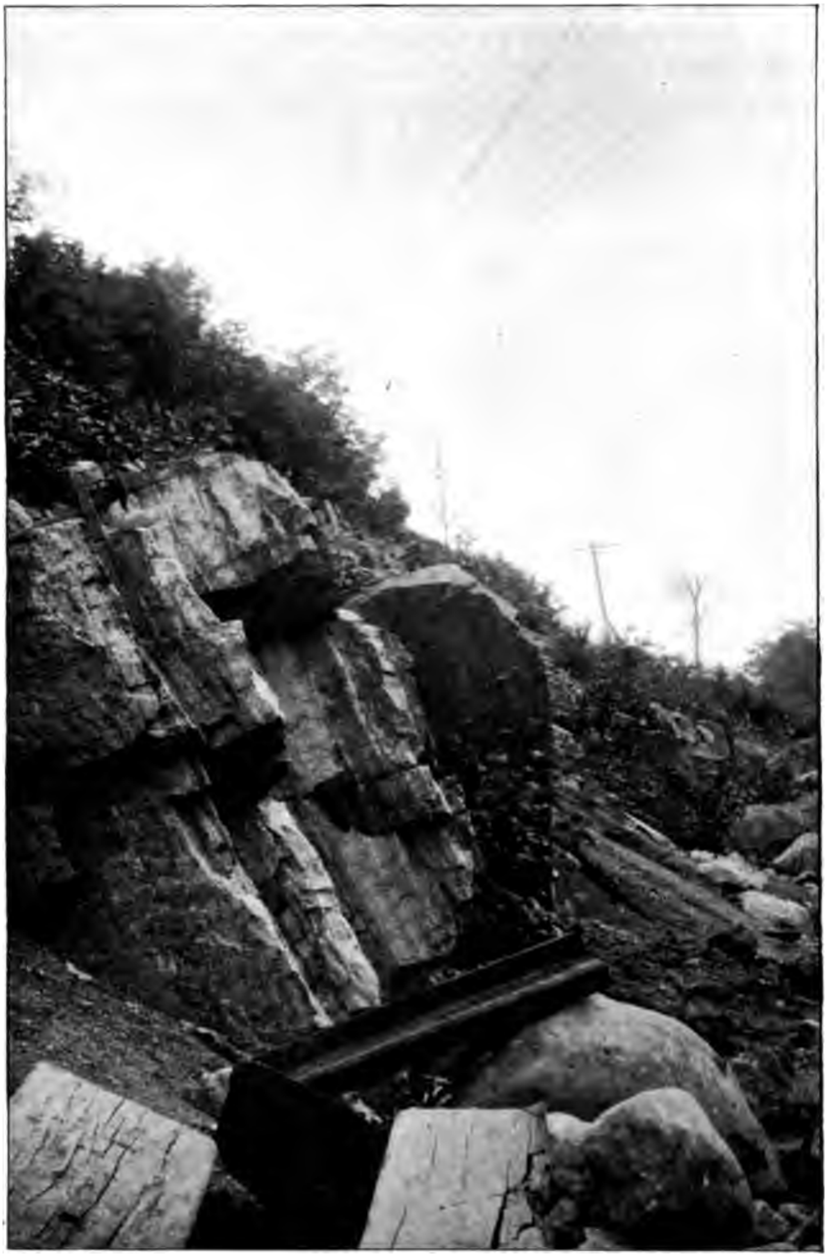


Fig. 2 Section in railroad cut near Loon lake, N. Y. *A*, augite-syenite. *B*, well banded quartzose gneisses. *C*, quartzose gneisses. *D*, biotitic sheared strip—strike north 10 degrees west. Dip of bedding and foliation 65 degrees to the west.

While the field relations are not well shown, the fact that the syenite extends unbroken for some distance on all sides of the exposure, and that no Grenville rocks are elsewhere exposed, makes it evident that we are dealing with but a small mass of these rocks wholly surrounded by syenite and hence of the nature of an inclosure in it. Many examples of precisely similar nature may be cited from the areas occupied by the great intrusions.

*Relations of syenite and anorthosite.* Just as the Diana syenite belt, because of juxtaposition to a considerable area of the Grenville rocks, has furnished conclusive proofs of the age relations

Plate 3



Banded gneiss included in augite-syenite. The hammer is at the contact

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of the two, so the evidence of age relations between syenite and anorthosite must be sought from those masses of the syenite which adjoin anorthosite. The only two such masses in the northern Adirondacks, aside from the small anorthosite outlier in Litchfield park, Franklin county, are the Tupper lake and Saranac river syenites. Each of these has furnished some evidence.

A long cut on the Saranac branch of the New York Central and Hudson River Railroad near Colby pond exposes an apparent dike of a gabbroic-looking rock some 30 feet in width, in the midst of the anorthosite gabbro of the cut. The dike shows a heavy blackish rock, darker colored and finer grained than the anorthosite gabbro. The thin section shows that its affiliations are with the syenites, and that it is quite like the gabbroic phase of the Diana syenite. It holds some 35% to 40% of minerals other than feldspar, these being augite, hypersthene, hornblende, biotite, garnet, magnetite and quartz (with small amounts of zircon, apatite, titanite and pyrite). The feldspar is entirely of intergrowth types, fine microperthitic or micrographic intergrowths of orthoclase and albite (or oligoclase). Quartz makes some 5% of the rock. The nature of the feldspar makes reference of the rock to gabbro impossible, yet it looks exceedingly like the ordinary dark gabbros of the region and is very difficult to tell from them in the field.

The west wall of the dike is well shown and is sharp, so that there seems no doubt that it actually is a dike. The igneous nature of the rock is beyond question.

Since the anorthosites grade at times at their borders into gabbroic gneisses which positively can not be distinguished from these gabbroid syenites in the field, it is evident that boundary mapping is attended with considerable hazard in districts where the two rocks adjoin and both show this differentiation.

A similar dike, 8 feet wide, is found cutting anorthosite in a railroad cut 3¼ miles west of Saranac Inn station. The main difference between the two rocks is that in this dike the feldspar, instead of consisting entirely of intergrowth types, as in the previous case, shows quite a considerable percentage of andesin, though the microperthite largely predominates. The rock is by no means so distinctly a syenite as in the previous case, but is rather an intermediate rock.

Three miles north of the depot at Tupper lake there is a small rock cut in a gabbroic-looking rock, somewhat more feldspathic than the rock of the two dikes, but very similar nevertheless and plainly closely related to them. It contains some 30% of dark minerals, and its feldspar is all of intergrowth types. Its field relations are with the syenite as a border phase, though it is close to the anorthosite boundary, and both its mineralogy and its chemical analysis show it to be a somewhat basic syenite.

In a cut a mile farther north anorthosite gabbro appears which shows rather frequent labradorite augen, but whose granular feldspars are andesin and microperthite in about equal quantity. In other words, the rock is an anorthosite with syenitic tendencies.

About halfway between Tupper Lake village and Wawbeek an interesting glaciated rock surface is shown by the roadside near the town line, exhibiting anorthosite gabbro cut intrusively by syenite, not as a single dike but as an invasion in force, wedging apart and surrounding great horses of the anorthosite. This syenite shows numerous feldspar augen and much more strongly resembles the usual syenite than do the preceding rocks. It is however more basic than the normal rock, having a considerable pyroxene-hornblende-garnet content. Feldspar forms some 75% of the rock however and is nearly all microperthite.

Nearly 1 mile farther east and hence that much farther within the anorthosite mass, is a knoll of gabbroid syenite almost precisely like the Colby pond dike. Its field relations to the surrounding anorthosite are not exhibited, though from analogy it must be a very large dike or else a small boss.

The small anorthosite outlier in Litchfield park has been already referred to. It is all surrounded by syenite gneisses and with good contacts exposed on one side. The rock is much more acid than in the previous exposures and yet is not normal syenite, though it is an igneous rock, a syenite, and identical with what appear as phases of the normal syenite elsewhere. It becomes fine grained at the contact, while the anorthosite shows no change in grain, and seems quite conclusively the younger rock; hence the disposition to regard the anorthosite as an inclusion in the other.

So far as the writer is aware, these are the only observations so far put on record in the Adirondack region which have any bearing on the relative age and relationships of the two rocks, syenite and anorthosite.[1] They definitely show (1) that the anorthosite is cut by a basic syenite, which is therefore younger; (2) that this basic syenite shows considerable variation from place to place and in one exposure bears a strong resemblance to the normal syenite; (3) that at times the normal syenite shows gradation into a gabbroid phase, best shown at Diana and Tupper lake, which is similar to the rock which cuts the anorthosite; and (4) that the anorthosite gabbro itself shows a tendency to the production of a similar rock by local differentiation, that is, a rock richer in pyroxene-hornblende-garnet-content than the ordinary anorthosite gabbro, but with oligoclase andesin instead of labradorite for the feldspar and with the development of much microperthite and some quartz in addition; and that at least one dike of a like rock occurs cutting anorthosite. But it has not yet been demonstrated that the syenite found cutting the anorthosite is connected with the main masses, yet such a demonstration is necessary in order to definitely prove the younger age of the latter. It may be argued however that dikes from a syenite mass would draw their material from its peripheral portions, and, if any differentiation had previously taken place, would naturally be more basic than the main mass. The Diana case proves that such differentiation has taken place on a considerable scale; it has also taken place at Tupper lake, and it is thought that plentiful evidence of the same sort would be forthcoming elsewhere, were it not for the general unsatisfactory character of the rock outcrops which prevail in the woods. It is therefore thought that the evidence strongly points to the occurrence of a considerable body of syenite in the region which is younger than the anorthosite. The occurrence of the syenite in a great number of separate masses renders it possible however that there may be some considerable age differences between them. And the fact that in many parts of the region there occur numerous small masses of similar rocks and some larger ones too, which are thoroughly gneissoid and much involved with other gneisses, may indicate a greater age for these.

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[1] For details *see* N. Y. State Geol., 20th An. Rep't. p.r25–r46.

But the great similarity between the rocks of most of the syenite masses seems to point to a close age relationship. The gabbroid phase of the syenite would seem, like the gabbroic borders of the anorthosite, to be due to differentiation after reaching their present situations. The great similarity between the two gabbroid rocks, as well as many mineralogic resemblances between the ordinary anorthosites and syenites, would be accounted for on the supposition that both rocks arose from the differentiation of a common deep seated magma, the anorthosite being erupted first and the syenite following at a somewhat later date. Such phenomena as are presented by the syenitic phase of the anorthosite, here appearing as a local differentiation of the ordinary anorthosite, there occurring in dikes cutting it, would be explained as, the one due to differentiation in place, the other in the magma beneath, with the ascent of a slight amount of material at this stage, following closely on the heels of the main anorthosite intrusion.

**Granites.** Perhaps the most abundant of all rocks in the Adirondack region are gneissoid granites and granitic gneisses. These are quite certainly of various ages. The granitic gneisses associated with the Grenville rocks as well as those which make up the bulk of the Saranac formation are unquestionably much older than the anorthosite, as shown at contacts and also by their occurrence as inclusions in the anorthosite. On the other hand dikes of granite are not infrequently found cutting the anorthosite, so frequently and over such a wide territory as to argue the existence of considerable bodies of this rock whence the dikes sprang. They are if anything still more frequent in the syenite, in which small granite bosses appear as well. Also localities are not uncommon in which two different granites are found, the one cutting the other. It seems therefore likely that all the granitic rocks of the region may be separated into two great groups, an older and a younger, the former very gneissoid in character and comprising the granitic content of the Grenville and Saranac formations, and the latter much less gneissoid and affiliated in age with the later great intrusions. In the latter certainly, and in the former probably, there are granites of more than one, perhaps of several different ages. The Grenville and Saranac rocks have been already described. It remains to consider the others. These appear in several forms, some fine and some coarse grained, some almost lacking in dark colored minerals and others comparatively rich in them, some representing well defined types which may be recognized anywhere, while others are more indefinite and variable, and all are much easier to recognize than to describe.

*Granitic phase of the syenite.* In several localities syenite has been noted passing into a red, granitic gneiss, as first shown by Smyth for the Diana area. In all cases observed the transition is gradual, and there can be no doubt of the unity of the two rocks. The Tupper lake syenite shows changes of the sort most excellently. The color change is gradual and intermediate rocks of mottled green and red appearance are not uncommon. Such are seen to good advantage in Litchfield park, where the numerous rock ledges, often blasted, along the carefully constructed roadways give exceptional advantages for observation. Quartz increases in amount in these rocks while pyroxene commonly disappears, being replaced by hornblende and biotite, usually in respectable amount. No analyses have yet been made of these rocks, and it may be that they do not quite reach a sufficient degree of acidity to justify their being classed as granites, but it seems that in large part they must do so, and they certainly represent as great a departure from the normal syenite type in one direction as the gabbroic variety does in the other. The rock shows the same variations in coarseness and in presence or absence of feldspar augen that the ordinary syenite exhibits. There is also in some varieties the same tendency of the quartz to assume the lens, or spindle form that is seen in the more quartzose syenites.

In going farther south this granitic phase of the syenite gives place to an even more distinctly granitic gneiss, or rather gneissoid granite, in which frequent patchy outcrops of both ordinary syenite and its granitic phase occur, and this rock extends out beyond the limits of the district which the writer has studied. The exposures have not been so situated as to permit of precise determination of the relations between the two, and the writer is in doubt concerning them. But whether this is the same rock or a different granite, it is so like the other in appearance and in amount of metamorphism, being mostly fairly coarse and with numerous feldspar augen, that there can be little doubt of the close relationship of the two rocks, and it may be safely stated that the two, if distinct, have arisen from the same parent magma and are not far separate in time. It is simply a question whether differentiation has taken place where the rocks now lie or has taken place beneath.

Running northeast from Litchfield park are two big rock ridges, pitching northwardly with gentle slopes, but breaking down in tremendous cliffs on the southwest, which are constituted of a reddish, coarsely gneissoid rock, grading locally into green patches of unmistakable syenite, which the field relations and the thin sections show to be nothing but an extra acid phase of the syenite [pl. 17]. The rock approaches granite but is not as decisively granitic as the previous rocks. It is however another instance of the passage of the syenite into a granitic rock, and the special interest which attaches to it comes from the fact that it is surrounded on all sides by ordinary syenite and hence seems clearly a central, acid differentiation of a syenite mass.

Occasional local reddish gneisses appear in the syenite of somewhat different nature from the foregoing, and in these the color change is not accompanied by much increase in acidity. A case of the sort is met in the section at Little Falls, the rock in question being a syenite full of feldspar augen, which has locally been so mashed and stretched that the augen have become nearly or entirely crushed, the product being a granular red feldspar which has been squeezed out into flat lenses, often tailing out into the rock as thin sheets of considerable extent. In some of these a bit of uncrushed feldspar still remains, and all stages between this extra mashed condition and the ordinary rock can be observed, so that there can be no question of the origin of the granular red feldspar; the origin of the color change is not manifest however, since the augen themselves are by no means red. Furthermore, the red color is confined to this portion of the rock, and the remainder is still of the gray green of the ordinary syenite. It is a precisely similar red gneiss that is found showing the intrusive contacts against the anorthosite outlier in Litchfield park, and which is regarded as an unquestionable phase of the syenite. The rock here however is not so mashed as at Little Falls, many augen remaining which are only partially granulated. The color change makes it an easy matter to determine just how much granular material has been produced from the crushing of each large feldspar, and the whole forms a very striking and instructive rock.

*Amount of differentiation of the syenite.* The field evidence, both at Diana and at Tupper lake, seems conclusive that the syenite varies into a quite basic, gabbroic-appearing rock on the one hand and into red, granitic gneisses on the other, showing thus considerably more differentiation in place than the anorthosites exhibit. The writer is also of the opinion that certain magnetite deposits of the region have originated as extra basic segregations from the syenite magma, in strict parallelism with the similar development of the titaniferous magnetite ore bodies of the anorthosite. He has however yet to meet with a case where the evidence for this is decisive, so that there is no intention here to emphasize this view unduly.

It is not yet clear whether the differentiation shown by the syenite is wholly due to changes in the rock mass itself during cooling, after the ordinary manner of such changes in igneous rocks, or whether it is in part due to the incorporation in the igneous mass of material melted away from the inclosing rocks. If the latter process ever takes place on a large scale, we might expect to find it here, in connection with these very large, and very deep seated igneous masses. The general sharp and clear-cut character of the contacts between the intrusives and the various rocks which they cut, as well as the corresponding sharpness of the contacts against the various inclusions of these rocks in the intrusives, does not seem indicative of any incorporation. Nor does the character of the border portion of the intrusive mass vary from place to place, as it successively cuts rocks of different character, as would naturally be expected on this view. Yet it is difficult to bring certain features in harmony with the other view. The usual result of differentiation is to produce a rudely radial concentric arrangement of the different rock varieties produced, usually with the most acid rock in the center and the most basic in the peripheral portions of the mass; sometimes however the reverse arrangement occurs, the basic rock being the central one. This of course is in the large way, and insignificant local variations, such as are specially characteristic of gabbros, are not in mind. Now both at Tupper lake and at Diana the gradation into granite appears to be a one-sided one, and with no apparent sign of any tendency to concentric arrangement. At Tupper lake the gabbroic phases of the syenite, so far as they have been noted, are all in the vicinity of the anorthosite, while the gradation into granite is apparently confined to the south side of the mass, and other granites appear in force beyond. This is certainly an unusual arrangement, and the cause, though not now manifest, may perhaps be brought out by more detailed work, specially in the unexplored country to the south.

*Morris granite.* There is one granite in the region which presents very definite characters, is generally found only in small masses, plainly cuts all the rocks heretofore described and hence is likely the latest granite in the region, and to which for convenience of reference and because of its usual easy recognition it seems worth while to give a name. Hence the term "Morris granite" is suggested for it, because of the considerable exposures which occur cutting the augite syenite on the west slopes of Mt Morris, Franklin county.

The rock is peculiar in that it consists almost wholly of alkali feldspar (mostly microperthite) and quartz. There is a trifling amount of hornblende and magnetite usually present, and occasional minute apatites and zircons, but they seldom form more than 5% of the whole. The feldspar is red in color, usually strongly so. The rock presents both coarse and fine grained phases, and it is the former which so characteristically marks the rock. The quartz is concentrated into long spindles or pencils, or else into long flattened lenses, giving the rock a pronounced linear structure; that is, the structure appears gneissoid on fractures parallel to the spindles and not at all gneissoid on fractures at right angles to them, since here the spindles present their rounded cross sections merely. Since the quartz percentage is high, these large spindles constitute a considerable portion of, and a very characteristic feature of the rock. Though no analyses have been made, the rock is plainly an exceedingly acid one.

The fine grained phase is however the more common one and is not so easy of recognition. It has the same mineral constitution as the coarse, but largely or entirely loses the spindle quartz character. Intermediate grades however occur. In small dikes it becomes a very finely granular, flinty appearing rock, and, where such dikes occur isolated, there may be considerable question as to their proper reference.

The fact that the two are merely phases of the same rock is shown at several localities, typically perhaps on the west shore of Big Tupper lake between Grindstone and Black bays. Here are excellent exposures which show the typical coarse granite cutting augite syenite, with the fine grained type produced as a contact phase, and constituting only a small proportion of the whole mass of the granite. Other exposures show the two in varying proportion, though as a whole the coarse type is less abundant than the fine.

This Morris granite is the only granitic rock among the later intrusives which belongs to this very acid type, and this makes it easy of recognition when it is associated with rocks belonging to this group, since it is the youngest of them all, with the possible exception of some of the gabbros. But gneissoid granites are not infrequently found in the region which cut Grenville or Saranac rocks and with none of the distinctive later intrusives in the vicinity, granites of a very acid type. When these are of the fine grained sort, as is usual, it is impossible to tell whether they are of the age of the Morris granite or are much older, older than any of the later intrusives. Such granites are quite frequent in the region, and have perhaps a specially wide distribution in the vicinity of St Regis Falls. It is quite probable that there is more than one granite of this character in the region.

**Gabbros.** These are mostly black, basic, heavy rocks, and have a very widespread distribution, perhaps more so than any of the later igneous rocks, but occur mostly in dikes or small masses, very seldom in masses of such size as are common with the other intrusives. The dikes are without exception fine grained black rocks. The central parts of the bosses are much coarser, the characteristic structures of the rock being here easily made out with the eye.

These rocks show much variation from place to place, due in part to local differentiation during cooling; in part to mutual corrosive effects of adjacent minerals on each other, both during the original cooling of the rock and as a result of subsequent metamorphism; and in large part to varying severity of metamorphism. Where least metamorphosed, a simple original mineral constitution is usually shown, the rock consisting essentially of plagioclase feldspar (usually labradorite), augite and magnetite; to these hypersthene is frequently to be added, and rarely olivine. These primary feldspars and augites invariably hold a multitude of minute inclusions, the augite specially containing them in such numbers that it would often be impossible to make out the color of the mineral were it not for the fact that a narrow outer zone is usually free from them. Nor is the feldspar far behind in this respect. The inclusions in the augite are mainly opaque and consist probably of magnetite or ilmenite. In large part the feldspar inclusions consist of small augites. The structure is rather prominently ophitic in most cases, that is, the feldspar is in long, lath-shaped crystals, separated by and partially embedded in the stout augite crystals.

From the extinction angles shown by the feldspars from various occurrences, it is quite certain that they show a range in composition from andesin to anorthite, with labradorite the prevailing variety. The augite is of a pale, gray-green shade, nearly colorless in thin sections.

In addition to the foregoing, even the least metamorphosed rocks show much granular material, and rocks which consist mainly or wholly of this, with little or no preservation of the original character, are far more common than those of which the reverse is true. This granular material is, to some extent, due to corrosive interaction of the original minerals of the rock. This is most apt to take place between magnetite and feldspar but also occurs between the pyroxenes and feldspar. In general nothing of the sort takes place at pyroxene magnetite contacts. The main new minerals produced by this action are garnet and a peculiar brown hornblende, with some quartz and often biotite accompanying. These are found arranged zonally between the two reacting minerals and may perhaps have developed during the cooling of the rock, since they are found in the least metamorphosed portions, and since such phenomena are known in other gabbros which have not been metamorphosed. In this manner are formed the well known "corrosion rims" which appear in many gabbros in all parts of the world.

In addition to these minerals there appear others in the granular condition in all rocks in which there is any trace of metamorphism. These are in the main the same as the original minerals of the rock, plagioclase (mostly labradorite), augite, hypersthene, and green hornblende. It seems quite certain that the material for the formation of these has been derived from the original minerals of the rock, and that the process has been one of granulation and recrystallization. The newly formed labradorite and augite are entirely lacking in the multitudinous inclusions which are so characteristic of the original minerals, and in virtue of which even the smallest remaining fragments of them may be detected. The original minerals may often be seen tailing off into granular material, which has evidently formed at their expense. But the grains are not mere shattered fragments of the larger crystals, but consist of a mixture of all the minerals mentioned above.

Additional minerals which are usually or occasionally present are apatite and titanite frequently, pyrite and pyrrhotite occasionally, and sometimes a little green spinel (pleonaste). Scapolite is sometimes present as an alteration product, and in the gneissoid gabbros there is often considerable untwinned feldspar which may be orthoclase.[1]

Some of the more important localities in the northern Adirondacks where these rocks occur are as follows:

In Clinton county at Keeseville, where occasional dikes of the gabbro are found cutting the anorthosite gabbro, showing that they are younger; at Petersburg, where exposures of a very wide dike are found on both sides of the river, showing both the ophitic and the granular types of the rock; a small boss on the northwest shore of Upper Chateaugay lake, which shows ophitic gabbro in the center passing rapidly into an amphibolite gneiss on all sides; and a considerable boss not far from the lower end of Chazy lake. These all show portions only slightly metamorphosed and still retaining ophitic structure. There are many other places in the county where wholly gneissoid rocks of gabbroic make-up occur as dikes and are in all likelihood referable to this same group. In Franklin county there is a considerable boss by the north branch of the Saranac, 2 miles east of Hunters Home, showing a fairly coarse rock with a comparatively unmetamorphosed core; there is another, well shown in cuts along the New York & Ottawa Railroad, 2 miles above St Regis Falls, which shows beautifully the gradual passage from the unchanged core into amphibolite, the latter containing a profusion of enormous garnets; and there is another showing along the west shore at the upper end of Lower Saranac lake, which is quite a large mass and correspondingly coarse, and which must cut the anorthosite, since it is surrounded by that rock on all sides, though no contacts were seen. There are here also numerous smaller masses and dikes which are more completely metamorphosed. Kemp and Smyth have shown the wide distribution of similar rocks in the eastern and western Adirondacks.

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[1] More detailed descriptions of some of these rocks may be found in the following papers:

**Kemp, J. F.** Am. Jour. Sci. August 1892, p.109–14.
——— Geol. Soc. Am. Bul. 5:213–24.
**Smyth, C. H. jr.** Am. Jour. Sci. July 1894, p.54–63.
——— Am. Jour. Sci. April 1896, p.273–81.
——— Geol. Soc. Am. Bul. 6:263–83.

To gabbros of this type, with ophitic structure, the name "hyperite" has been applied by Tornebohm.

In many localities metamorphism has produced an amphibolite from these gabbros, instead of the merely granulitic gabbro. In these amphibolite phases there is always considerable pyroxene in addition to the hornblende, but in the field these are absolutely not to be distinguished from the amphibolites associated with the various gneisses, and these too often contain pyroxenes. Where there is an unmetamorphosed core, the origin and relations are evident, otherwise they are wholly obscure. This gradation is beautifully shown at the localities on Upper Chateaugay lake and along the New York & Ottawa Railroad referred to above.

The fact that these gabbros are found in dikes cutting the anorthosites shows conclusively that they are younger. The writer has noted gabbro dikes also cutting the syenite in the Little

Falls outlier, and hence younger. But he has so far met with no instance of gabbro cutting the syenite masses in the north, nor of cutting the distinctly later granites, though many cases are known in which granitic gneisses of uncertain age are cut. This, together with the fact that there is no evidence to show that the syenite at Little Falls is of the same age as that to the north, causes hesitation in regard to the relative ages of the syenite and gabbro there. It is thought to be highly probable however that the gabbro is the youngest rock, and that the order of appearance of the great intrusions was, first anorthosite, followed in order by syenite, granite and gabbro.

**Chemical analyses.** A sufficient number of chemical analyses of the rocks of the great intrusions have been made to give a very fair idea of their range in composition, and to show their close relationship to one another. To date, analyses of the later granites wholly fail so far as the writer is aware, and hence the more acid members of the group are lacking. But their mineralogy indicates a close relationship to, and gradation into the others through the medium of the acid syenites, and it may be confidently stated that their analyses will fall regularly into the series, and show a regular gradation from the acid syenites through ordinary granite to the very acid Morris granite.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| $SiO_2$ | 44.77 | 47.42 | 51.62 | 54.47 | 54.62 | 54.38 | 57 |
| $Al_2O_3$ | 12.46 | 17.34 | 24.45 | 26.45 | 26.5 | 20.53 | 16.01 |
| $Fe_2O_3$ | 4.63 | 4.91 | 1.65 | 1.3 | .75 | 2.78 | 10.3 |
| FeO | 12.99 | 10.22 | 5.3 | .66 | .56 | 5.5 | |
| MgO | 5.34 | 5.21 | 1.21 | .69 | .74 | 1.90 | 1.62 |
| CaO | 10.2 | 8.09 | 9.97 | 10.8 | 9.88 | 5.39 | 6.2 |
| $Na_2O$ | 2.47 | 3.48 | 3.49 | 4.37 | 4.5 | 5.2 | 4.35 |
| $K_2O$ | .95 | 1.89 | 1.27 | .92 | 1.23 | 3.4 | 3.53 |
| $H_2O$ | .6 | 1.13 | .72 | .53 | .91 | .5 | .15 |
| $CO_2$ | .37 | ...... | ...... | ...... | ...... | ...... | ...... |
| $TiO_2$ | 5.26 | 3.6 | ...... | ...... | ...... | .09 | ...... |
| $P_2O_5$ | .28 | .06 | .01 | ...... | ...... | .15 | ...... |
| Cl | ...... | .21 | ...... | ...... | ...... | .03 | ...... |
| F | ...... | ...... | ...... | ...... | ...... | .03 | ...... |
| S | .26 | ...... | ...... | ...... | ...... | ...... | ...... |
| MnO | .17 | .06 | .1 | ...... | ...... | .01 | ...... |
| BaO | trace | .04 | ...... | ...... | ...... | .16 | ...... |
| Total | 100.75 | 100.01 | 99.79 | 100.19 | 99.7 | 100.03 | 99.18 |
| *Sp. gr.* | 3.09 | | 2.798 | 2.72 | 2.7 | 2.7 | |

| | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|
| $SiO_2$ .......... | 59.7 | 61.01 | 60.47 | 63.45 | 65.65 | 66.72 | 68.5 |
| $Al_2O_3$ .......... | 19.52 | 15.36 | 16.36 | 18.38 | 16.84 | 16.15 | 14.69 |
| $Fe_2O_3$ .......... | 1.16 | 10.75 | .8 | .42 | 4.01 | 3.42 | 1.34 |
| FeO .......... | 5.65 | | 8.76 | 3.56 | | | 3.25 |
| MgO .......... | .78 | .78 | 1.31 | .35 | .13 | .73 | .26 |
| CaO .......... | 3.36 | 4.05 | 2.94 | 3.06 | 2.47 | 2.3 | 2.2 |
| $Na_2O$ .......... | 5.31 | 3.68 | 4.65 | 5.06 | 5.27 | 4.36 | 3.5 |
| $Ka_2O$ .......... | 4.14 | 3.9 | 4.71 | 5.15 | 5.04 | 5.66 | 5.9 |
| $H_2O$ .......... | .52 | .49 | .09 | .3 | .3 | .77 | .4 |
| $TiO_2$ .......... | ...... | ...... | ...... | .07 | ...... | ...... | ...... |
| $P_2O_5$ .......... | ...... | ...... | ...... | ...... | ...... | ...... | .03 |
| MnO .......... | .09 | .08 | .12 | trace | ...... | .07 | .1 |
| BaO .......... | ...... | ...... | ...... | .13 | ...... | ...... | .05 |
| Total ...... | 100.23 | 100.1 | 100.21 | 99.73 | 99.71 | 100.18 | 100.22 |
| Sp. gr.......... | 2.674 | | 2.82 | 2.72 | | | |

## Molecular ratios

| | 3 | 4 | 6 | 8 | 9 | 11 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|
| $SiO_2$ ... | .8603 | .9078 | .9063 | .995 | 1.0168 | 1.0575 | 1.112 | 1.1417 |
| $Al_2O_3$ .. | .2397 | .2593 | .2004 | .1912 | .1506 | .1795 | .1584 | .144 |
| $Fe_2O_3$ .. | .0103 | .0081 | .0174 | .0072 | .0216 | .0026 | ...... | .008 |
| FeO ... | .0736 | .0092 | .0764 | .0785 | .1014 | .0494 | .0475 | .0451 |
| MgO .. | .0302 | .0172 | .0497 | .0195 | .0195 | .0087 | .0182 | .0065 |
| CaO ... | .178 | .1929 | .0963 | .06 | .0723 | .0523 | .0411 | .0393 |
| $Na_2O$ .. | .0563 | .0705 | .0839 | .0856 | .0594 | .0816 | .0703 | .0565 |
| $K_2O$ ... | .0135 | .0097 | .0357 | .0439 | .0414 | .0547 | .0601 | .0626 |

1 Norite, wall rock of titaniferous magnetite deposit, Lincoln pond, Elizabethtown, Essex co. Description by J. F. Kemp, analysis by W. F. Hillebrand, U. S. Geol. Sur. 1899. 19th An. Rep't, pt 3, p.407.

2 Gabbro (hyperite), dike near Nicholville, Hopkinton, St Lawrence co. Brief mention by H. P. Cushing. 16th An. Rep't N. Y. State Geol. 1899. p.22. E. W. Morley analyst.

3 Anorthosite gabbro, Carnes's quarry, Altona, Clinton co. Description by H. P. Cushing, analysis by E. W. Morley. 19th An. Rep't N. Y. State Geol. 1901. p.r58.

4 Anorthosite, summit of Mt Marcy, Keene, Essex co. A. R. Leeds analyst. N. Y. State Mus. 30th An. Rep't. 1878. p.92.

5 Anorthosite, Keene township, Essex co. (precise locality not given). A. R. Leeds analyst. N. Y. State Mus. 30th An. Rep't. 1878.

6 Anorthosite showing transition to augite syenite, cut by N. Y. C. & H. R. R. R. nearly 5 miles north of Tupper Lake Junction, Altamont, Franklin co. Description by H. P. Cushing, analysis by E. W. Morley. 20th An. Rep't N. Y. State Geol. 1902. p.r68.

7 Gabbro, intermediate between gabbro and augite syenite and occurring as a basic phase of the latter; from Natural Bridge, Diana, Lewis co. *Description* and analysis by C. H. Smyth jr. Geol. Soc. Am. Bul. *6:274.*

8 Augite syenite from the great intrusion into anorthosite, road from Tupper lake to Wawbeek, ½ mile east of Halfway brook, which marks the line between townships 22 and 23, Franklin co. Description by Cushing, analysis by Morley. 20th An. Rep't N. Y. State Geol. 1902. p.r69.

9 Augite syenite, cut by N. Y. C. & H. R. R. R. 3½ miles north of Tupper Lake Junction and 1 mile from the first anorthosite outcrops, the latter being of the transition type, analysis 6; Altamont, Franklin co. Description by Cushing, analysis by Morley. 20th An. Rep't N. Y. State Geol. 1902. p.r69.

10 Gneiss, referred somewhat doubtfully to augite syenite; occurs involved with a later granitic gneiss in the border zone of the augite syenite; from cut by N. Y. C. & H. R. R. R. between Piercefield and Childwold, and 1 mile from the latter; Hopkinton, St Lawrence co. Description by Cushing, analysis by Morley. 20th An. Rep't N. Y. State Geol. 1902. p.r70.

11 Augite syenite, Loon lake, Franklin co., typical. Description by H. P. Cushing, analysis by E. W. Morley. Geol. Soc. Am. Bul. 10:177-92.

12 Augite syenite, near Harrisville, Diana, Lewis co.; the gabbroic rock, analysis 7, is a differentiation phase of this syenite. Description and analysis by C. H. Smyth jr. Geol. Soc. Am. Bul. 6:271-74; and 17th An. Rep't N. Y. State Geol. 1899. p.471–86.

13 Augite syenite, Little Falls, Herkimer co. Description by Cushing, analysis by E. W. Morley. 20th An. Rep't N. Y. State Geol. 1902. p.r69.

14 Quartz augite syenite, from border zone and accompanied by granite, cut by N. Y. & Ottawa R. R. 2½ miles south of Willis pond, Altamont, Franklin co. Description by Cushing, analysis by Morley. 20th An. Rep't N. Y. State Geol. 1902. p.r69.

*Discussion.* The gabbros are the most basic rocks of the Adirondack eruptive core, except for their own local, iron-rich differentiations, which give rise to the titaniferous magnetite ore deposits. The two analyses, 1 and 2, represent well their general composition and the usual limits of their variation. They are quite ordinary gabbros and show no differences worthy of mention when compared with most rocks of the sort.

Unfortunately, with the exception of analysis 3, no analyses are available of the transition rocks between the gabbros and the anorthosites, such transition rocks occurring at the borders of the main anorthosite bodies as well as in smaller, separate masses, though the general differentiation of the gabbro and anorthosite must be regarded as having taken place below, in the parent magma of both. The smaller anorthosite bodies, such as those near Keeseville and on Rand hill in Clinton county, the latter *furnishing the* rock whose analyses appear in column 3, are very markedly gabbroic. The analysis, however, shows a rock which, in its high alumina and rather low iron and magnesia, is much closer to anorthosite than to gabbro. It, nevertheless, represents an intermediate stage in every single constituent. It was chosen for analysis because of its freshness and in spite of the fact that it appeared to be the most anorthositic portion of the Rand hill body and therefore not a fair representative of its general character. The main rock is a more strictly intermediate one, and the same thing is true of the Keeseville rock and of much of the border of the great anorthosite mass of Franklin county.

As close a calculation as can be made of the mineral composition of the anorthosite gabbro of analysis 3, without analysis of the component minerals, indicates some 70% of feldspar, made up of orthoclase 7.5%, albite 29.75% and anorthite 32%. In addition there are 11.75% of garnet, 7% of augite, 4% of hornblende, 2.5% of magnetite and 5% of quartz. The free quartz is specially noteworthy in so basic a rock, is usually to be found in the anorthosite gabbro of the region, and recalls the quartz norites described by Kolderup as associated with anorthosite in the Ekersund-Soggendal district in Norway. For comparative purposes four of his analyses are appended.

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| $SiO_2$ | 53.42 | 52.61 | 52.21 | 53.28 | 51.62 |
| $Al_2O_3$ | 28.36 | 27.15 | 19.24 | 23.3 | 24.45 |
| $Fe_2O_3$ | 1.8 | 4.05 | 10.46 | 7.55 | 1.65 |
| $FeO$ | | | | | 5.3 |
| $MgO$ | .31 | 1.55 | 2.36 | 3.02 | 1.21 |
| $CaO$ | 10.49 | 9.96 | 7.28 | 5.01 | 9.97 |
| $Na_2O$ | 4.82 | 4.53 | 3.48 | 3.9 | 3.49 |
| $K_2O$ | .84 | .78 | 1.09 | 1.51 | 1.27 |

1 Anorthosite (labradorit), Ogne, Norway. Kolderup analyst. Die Labradorfelse des westlichen Norwegens. Bergens museums aarbog. 1896. p.20.
2 Anorthosite norite (labradoritnorit), Ekersund. Kolderup analyst. p.20.
3 Quartz norite, Soggendal. Kolderup analyst. p.16.
4 Quartz norite, Theingsvaag bei Ekersund. Kolderup analyst. p.16.
5 Anorthosite gabbro, Carnes's quarry, Rand hill.

It is to be noted that Kolderup's quartz norites are more typical for the rock than the one analyzed from the Adirondacks, that approaching anorthosite more closely and being more like his anorthosite norite in many respects. His quartz norites show 10% or more of quartz as against the 5% of the Rand hill rock. But, as has been stated, the larger part of the Rand hill rock is more quartzose than the specimen analyzed and would in all probability approach his quartz norite very closely.

The chemical differences between the anorthosite gabbro of analysis 3 and the anorthosites of 4 and 5 of the original table are slight, 3 showing diminished silica, alumina and soda, and increased iron and magnesia; they suffice however to cause a drop in the feldspar content from over 90% in the anorthosite to 70% in the anorthosite gabbro. In all these anorthositic rocks part of the potash is in the labradorite, replacing a certain amount of soda. Analyses of this feldspar always show it, and, in calculating the rock analyses, it is necessary to assume that part of the calculated orthoclase goes with the albite to form labradorite, in order to bring about agreement between the computation and the observed optical properties of the feldspar.

The rock analyzed in column 6 has the appearance of an intermediate rock in the hand specimen, the feldspar augen resembling labradorite, and being sometimes iridescent, the granular portion having the look of augite syenite. Cleavage fragments from the augen give extinctions of—5° on 001 and—19° on 010, and hence are close to labradorite, $Ab_1$ $An_1$. But the granular feldspar is in part microperthite, and in part an acid plagioclase. The alkali percentage is abnormally high for so basic a rock. The total bases bear a very high ratio to the silica and alumina, and the considerable alteration of the augite to a chloritic aggregate renders attempts at calculation of the mineral percentages hazardous. The rock is approximately composed of orthoclase 20%, albite 44%, anorthite 11%, magnetite 4%, and the remainder of augite and garnet in the ratio of 2 to 1, including a little hornblende, apatite and quartz, the latter only as a by-product of garnet formation. In its high alkali percentage and consequent feldspars, the rock distinctly approaches the syenites, though its silica percentage remains that of the normal anorthosite.

The gabbro of column 7 is a most interesting rock. Its occurrence with, and as a differentiation product of an augite syenite body, of which it must be regarded as a basic phase rather than as a true gabbro, and its intermediate position chemically between augite syenite and gabbro, are very suggestive. Like the intermediate rock of column 6, it departs most widely from both the syenites and the anorthosites in its magnesia percentage, the general Adirondack intrusives being abnormally low in that oxid. It occupies an intermediate position between syenite and gabbro, rather than between syenite and anorthosite, and as such is nearer syenite than gabbro chemically. Through the kindness of Professor Smyth, the writer is in possession of a slide and specimen of this rock. The analysis gives the iron as all in the ferrous condition, but there is quite a little magnetite in the rock, and a rough calculation indicates its approximate composition to be 21% orthoclase, 36.75% albite, 13.75% anorthite, 3% magnetite and 25% augite and hornblende. The feldspar content is quite like that of the preceding rock, the augen consisting of labradorite and the granular feldspar of microperthite and acid plagioclase.

The remaining seven analyses, no. 10 excepted, are all of unmistakable syenite and gave an excellent representation of its variation. The ferrous iron percentage is mostly high, and the results of some of the analyses tend to throw doubt on the reliability of the entire series of ferrous iron determinations, and hence to greatly complicate attempts to calculate the mineral percentages. The two most clearly abnormal results are those of analyses 9 and 13. In the former case the result of the ferrous iron determination exactly equaled the total iron in the rock, yet the thin section showed considerable magnetite present, and a rough separation by means of heavy solutions and a bar magnet proved the presence of at least 5% of that mineral. In the latter case the total iron present is 3.42%, yet the ferrous iron result exceeded 5%. While only these two were on their face erroneous, others, such as nos. 10 and 11, are quite suspicious. The disturbing cause can not be pyrite, since there is so little of it present that the sulfur percentage does not in general reach .01%. It is difficult to see how carbonaceous matter other than graphite can be present, and in an igneous rock any considerable amount of graphite would be surprising. The cause of the vitiation is as yet undetected.

The only analysis so far made of the augite syenite which occurs cutting the anorthosite, analysis 8, indicates that to be somewhat more basic than the usual rock, and this seems to be true of all such syenite, so far as can be judged by the thin sections. Garnet is much more abundant than in the usual syenite, and bronzite is lacking. The analysis indicates a rock composed of 24.25% orthoclase, 44.55% albite, 5.6% anorthite, 1.7% magnetite, 5.8% garnet, 14.5% augite and 3% quartz. If the ferrous iron be too high, and this is possible, though the discrepancy can not be great in this case, the magnetite and anorthite percentages would be slightly increased and those of augite and quartz diminished. Except for a slight amount of acid plagioclase, the feldspar is all of the intergrowth types, and cleavage fragments from the crushed rock show the optical characters of anorthoclase, viz a + 9° extinction on M, with an acute bisectrix in the center of the field.

The rock used for the next analysis, 9, is from near the anorthosite boundary. Ferro-magnesian silicates are more prominent than usual, considerable hornblende, augite and garnet being present and some bronzite, altogether constituting some 30% of the rock. The lower alkalis show the diminished feldspar percentage, but a calculation is rendered impossible by failure of the ferrous iron determination. On the basis of 5% of magnetite, as indicated by the separation previously mentioned, the calculation gives a silica residue amounting to 13% of free quartz, which is much too high, there being but little present. The remaining analyses require little comment aside from no. 10. No. 11 is regarded as giving the closest approximation to the mean composition of the rock and is from the Loon lake type locality.

The pyroxenes and hornblende which these rocks contain are precisely like those in the anorthosites, strongly suggesting community of origin. The feldspars are alkali feldspars with closely corresponding soda and potash content. In the general rock garnet is a much less conspicuous feature than in the anorthosites, and is often wholly absent. This is but natural, since the garnet is not primary but has resulted from the interaction of feldspar and magnetite. It is a lime-iron-alumina garnet, and the necessary lime for its formation is lacking in the alkali feldspar of the syenite. A further distinction between the two rocks lies in the abundance of zircon in the syenite. It by no means rises to the dignity of an essential constituent but is much more abundant and attains a larger size than in the usual igneous rock. The syenites contain quartz almost without exception, and the amount increases toward the acid end of the series, the calculation of the analysis of column 14 showing 14% of that mineral.

Analysis 10 is of a green gneiss which occurs associated with granite and granitic gneiss near Piercefield. Its field relationships to the syenite are not plain, and the doubt about its properly belonging with them is not cleared away by the analysis, which falls slightly out of the series in its magnesia-lime ratio and in its total magnesia. The rocks nearest it in silica percentage, 8 and 9, have this ratio, 1:3 and 1:3.5 respectively, as against 1:1.7 in 10. Its ratio is nearest to that of 13. On the other hand, it can be argued that its general great similarity in composition would seem to ally it closely with the syenites, and that these show a great variation in the magnesia-lime ratio, even though it approaches so near to equality in no other.

**General characters of the Adirondack eruptives.** The analyses in the preceding table are thought to be sufficiently numerous to furnish a very fair representation of the general characters of the Adirondack eruptives, except for the lack of analyses of the granites. The latter vary greatly, ending with very acid rocks composed almost wholly of quartz and feldspar. It is quite safe to say that they will reach 75% of silica and probably higher, and that, since their feldspar is universally microperthite, the ratio of soda to potash will remain substantially as it is in the syenites.

The gabbros and anorthosites are quite normal representatives of these groups. But in the transition rocks between these and the syenites we find low magnesia, low ratio of lime and magnesia to alkalis, and approximately equal amounts of soda and potash, and these characters continue to the end of the series. The soda-potash ratio is a slowly changing one, the potash being at first below, but eventually overhauling and passing the soda in the more acid rocks. In these respects the syenites, and probably the granites, depart somewhat from the corresponding rocks of the Ekersund-Soggendal area in Norway, which also accompany anorthosite and gabbro, and which Kolderup has so exhaustively described. In general the Adirondack syenitic rocks run higher in the alkalis and lower in lime and magnesia than the corresponding Norwegian rocks. These differences are but slight, and the general agreement between the two series is very close, but they point to a slight original difference in the character of the parent magma of the two districts. The appended analyses bring this out clearly.

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $SiO_2$ | 57 | 57.11 | 63.45 | 64.35 | 68.5 | 70.33 |
| $Al_2O_3$ | 16.01 | 17 | 18.38 | 15.46 | 14.69 | 15.59 |
| $Fe_2O_3$ | | | .42 | | 1.34 | 1.4 |
| | 10.3 | 12.48 | | 7.5 | | |
| FeO | | | 3.56 | | 3.25 | 1.54 |
| MgO | 1.62 | 1.78 | .35 | .5 | .26 | 1.3 |
| CaO | 6.2 | 3.99 | 3.06 | 3.58 | 2.2 | 3.05 |
| $Na_2O$ | 4.35 | 3.96 | 5.06 | 3.28 | 3.5 | 4.5 |
| $K_2O$ | 3.53 | 2.59 | 5.15 | 3.54 | 5.9 | 1.29 |
| $H_2O$ | .15 | ...... | .3 | ...... | .4 | ...... |
| $TiO_2$ | ...... | 1.59 | .07 | 1.63 | ...... | .85 |
| $ZrO_2$ | ...... | ...... | ...... | ...... | MnO .1 | .24 |
| BaO | ...... | ...... | .13 | ...... | .05 | ...... |
| Total | 99.16 | 100.5 | 99.73 | 99.84 | 100.22 | 100.09 |

1 Basic syenite from Natural Bridge; 7 of previous table.

2 Monzonite from Fuldland near Farsund. Description and analysis by C. F. Kolderup. Die Labradorfelse des westlichen Norwegens, Bergens museums aarbog. 1896. p.129.

3 Augite syenite from Loon lake; 11 of previous table.

4 Banatite from Dypvik near Farsund. Die Labradorfelse des westlichen Norwegens, p.123.

5 Quartz augite syenite from near Willis pond; 14 of previous table.

6 Adamellite from Farsund. Die Labradorfelse des westlichen Norwegens p.115.

So far as their mineralogy is concerned, the Adirondack rocks would fall without question in the monzonite group. The prevailing feldspar is microperthite in which the plagioclase molecule is constantly in excess of the orthoclase, so that they are strictly plagioclase orthoclase rocks. The table brings out the chemical differences, which would seem mainly due to the fact that the plagioclase in the microperthite is albite in the Adirondack rocks and oligoclase in the Norwegian. Certainly the

Adirondack rocks closely approach the monzonite type. They also closely approach Brögger's akerite type (quartz augite syenite) from near Christiania, and seem to occupy a position intermediate between the two. Smyth's rock from Natural Bridge, column 1 of the above table, would certainly fall within the monzonite group, notwithstanding its high lime percentage; and the rock from north of Tupper lake, column 9 of the original table, belongs also in that group lying on the border land between monzonite and banatite.[1] Because of this, it is perhaps more logical to refer all the Adirondack syenite to that group, though as a somewhat aberrant type.

It would therefore appear that in each district a very similar magma has given rise to a very similar rock series, and, it is likely, through a similar differentiation process. The order of succession of the different types can not be compared, since the Adirondack succession is uncertain in one respect. The syenite followed the anorthosite, and then came the granite, but the position of the gabbro is uncertain. It is certainly later than the anorthosite, and certain gabbroic dikes which have been found cutting the syenite lead to the impression that it is later than that, but there is some question as to the correctness of their reference to the main gabbro of the region. There may have been two periods of gabbro outflow, one earlier and the other later than the syenite.

A few dikes, and a few small eruptive masses, of three or four different types, have been noted which are not referable to any of the great masses apparently. But as yet their relationships are obscure. All are younger than the anorthosite, and all are metamorphosed.

**General metamorphosed condition of the intrusives.** All these igneous rocks have undergone severe metamorphism, as shown by the partial or complete granulation of the original minerals, the large amount of recrystallization, and the production of foliation in varying degree. In all of them the amount of change varies from place to place. In a rude degree all the intrusive masses show greater metamorphism toward their edges than at their centers, and because of this the large masses are apt to show a larger proportion of slightly metamorphosed rock than the small masses do. All of them also show local variations in this respect. As a general rule the anorthosite is the least metamorphosed of all the intrusives. If it were younger than the others, its condition in this respect would find ready explanation; and, not only that, but its condition furnishes a perfectly valid argument in favor of its younger age. Such evidence as exists that it is the oldest, rather than the youngest of the intrusives, has already been given in detail, and, if this be the case, other evidence must be produced to account for its apparent lesser degree of metamorphism. This evidence is of threefold character and derived from the distribution, the original texture and the composition of the rock. The main anorthosite of the district occurs as a single great intrusive mass, while the other intrusives are found in a number of smaller, disconnected masses, hence, for the reason just outlined, the rude relationship between size of intrusion and thoroughness of metamorphism, the anorthosite should in general be less metamorphosed than the others.

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[1] The monzonite group was established by Brögger to contain rocks intermediate between the granite syenite group (orthoclase rocks) on the one hand, and the diorite gabbro group (plagioclase rocks) on the other; hence characterized by both orthoclase and plagioclase. Monzonite has a silica percentage between 50% and 60%, banatite between 60% and 66%, and adamellite over 66%.

The anorthosite was originally a vastly more coarsely crystalline rock than were any of the other intrusives. The granulation of these rocks begins at the margins of the separate crystals and works inward by degrees, so that the amount of granulation necessary to completely obliterate the original crystals is, other things being equal, dependent on their size, since the smaller they are the more margins there are where the process can be initiated, and the greater the rapidity of destruction.

The anorthosite has also a simpler mineral composition than the other intrusive rocks, since it is mainly or wholly made up of the one mineral, labradorite. Hence there is afforded comparatively little opportunity for the development of new minerals by corrosion, so that recrystallization has not gone on to the extent that it has in the other rocks, and in so far as it has occurred, can mostly only give rise to more labradorite.

With the passage of the rock into anorthosite gabbro, recrystallization always comes much more largely into play, because of the more varied mineral composition, facilitating corrosion and causing more or less foliation. It is thought that there is here a reasonable and likely the true explanation of the *apparent* less metamorphosed condition of the anorthosite.

The Grenville and Saranac rocks are apparently more thoroughly metamorphosed than the later intrusions. They are more uniformly granular, better foliated, much more completely recrystallized and with a usual utter lack of all traces of original textures. These same characters are also found in the inclusions of these rocks which occur in the intrusives and seem to the writer to indicate that they were somewhat metamorphosed, at least, before the time of the intrusions. While no doubt the heat and pressure incident on their intrusion must have exerted considerable effect on the older rocks, the evidence does not point to this as of prime importance in their metamorphism.

But the distinction between the two sets of rocks is in many ways not a sharp one and is difficult to apply. The more thorough foliation and complete recrystallization of the Grenville rocks may be accounted for by the fact that they were originally fine grained sedimentary rocks, and that their metamorphism is not necessarily more extreme than that of the intrusives. But the more metamorphosed character of the igneous Saranac rocks can not thus be accounted for. The whole problem of their age and relationships is one of such uncertainty however that it is somewhat unsafe to emphasize comparisons between them and the intrusives. They are cut in places by small masses of the intrusives and they must occur as inclusions in them. The difficulty of the whole matter arises from the fact that the Saranac rocks are so similar to the more gneissoid phases of the granite, syenite and gabbro masses that it is frequently impossible to tell with which rock one is dealing. Small, later intrusive masses in the Dannemora rocks may be so thoroughly gneissoid as to appear like an integral part of the group. Specially among the granitic Saranac gneisses traces of cataclastic structure are often found, and of igneous textures; yet one can seldom be sure in such cases that one is not dealing with a later intrusive.

That there are igneous gneisses in the region which are older than the anorthosite is certain, since such rocks are found cut intrusively by it. That these rocks are for the most part thoroughly gneissoid, more so than is true of any of the larger intrusive masses, is also certain. It would therefore seem that they must have been somewhat metamorphosed before the appearance of the intrusives, but that the criterion is not one which can be used in all cases for the purpose of discriminating between the two sets of rocks.

If the intrusion of the great igneous masses had been the prime factor in the metamorphism of the older gneisses, their foliation should show a general parallelism to the boundaries of the intrusions. In general it does not show this, but on the contrary is mostly independent in direction. Adams has described a notable instance in Canada, where the strike of the foliation of the gneiss around the Morin anorthosite rather minutely parallels the boundary on three sides of the mass.[1] But it does not follow it on the fourth side, the anorthosite is also foliated near the boundary, and its foliation everywhere parallels that of the gneiss, and Adams regards it as having been produced in both at the same time, and necessarily subsequent to the intrusion.

No similar case of striking parallelism has been noted in the Adirondacks so far as the writer is aware, and it is also true here that locality for locality, the foliation of the older gneisses and of the intrusions corresponds, indicating that it is due to a common cause, operating after the appearance of all the intrusives, since they all show foliation. It is no doubt true, as urged by Adams, that the contact lines between the two sets of rocks will form lines of weakness, along which there will be a special tendency to stretching, and which may locally influence the direction taken by the foliation, when not overbalanced by other things. But so far as the writer's observation in the Adirondacks goes, parallelism is the exception rather than the rule.

The universal concordance in foliation between the gneisses and the intrusives makes it impossible to say whether the former possessed any previous foliation or not. If so, it was either destroyed by the later metamorphism, or else the two pressures came from the same direction, and the later foliation was superimposed on the earlier, this being much the more probable of the two.

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[1] *Geol. Sur. Can.* 8:13J-15J.

It has previously been stated that the character of the metamorphism which these rocks have undergone is indicative that they must have been deeply buried at the time of metamorphism. The igneous rocks specially are rocks of the most massive and resistant sort; yet over a large part of the region their constituent crystals have been broken up into a mass of granular fragments, accompanied by much recrystallization. The rock masses have also been shortened in the direction of greatest pressure and extended in the plane at right angles to this, with the production of foliation in this plane; and all this has taken place under such great load that no permanent cracks could form, all breaks being closed up by welding as soon as formed, so that the rocks have in general not been weakened and have often been made stronger by the process. The depth below the surface at which permanent cracks can not exist is considerable and moreover varies with the nature of the rock concerned, being greatest for strong, massive igneous rocks of this character. Yet during metamorphism these rocks were at that depth. The change in shape has been effected by actual movement of the rock particles, so that the rock must have been sufficiently loaded to be plastic. Large feldspar crystals have been bent through considerable angles without breakage. Quartzes have been drawn out into long lenses and spindles. A multitude of phenomena showing stretching of the rock, accompanied by actual flowage of the material, could be cited, yet the strength of the rock has not been impaired. The rocks have been under a pressure whose amount exceeded their ultimate strength, and under a load sufficient to cause welding up of all cracks. The exact depth of burial necessary to bring about these conditions in rocks of this sort is uncertain, but a depth of 5 miles is probably not more than a mile or two wide of the mark in either direction.

As near as can be judged from the small and scattered Grenville exposures in the heart of the district, their foliation is everywhere parallel to the original bedding. It is also true that, over much of the district, the foliation dips are comparatively flat, though no such striking instance has been met with as Adams has described in Canada.[1] The general foliation strike in the Adirondacks is n.e. and s.w., and the usual dip is to the east, though there are many exceptions to both rules. In some districts there is evidence of considerable folding of the bedding and foliation planes but it is seldom sharp, and intricate folding and plication occur seldom, if ever. Van Hise has suggested that the development of foliation parallel to bedding may have been initiated by vertical shortening and horizontal elongation below the level of no strain, or of no lateral stress, and that in subsequent compression and folding the varying strength of the different beds controlled the movement and kept it in the same planes.[2] This is an ingenious and very plausible suggestion, the likelihood of which is emphasized by the many evidences of the deep seated character of the metamorphism. But the uniformity of direction of foliation in both sedimentary and igneous rocks shows that the metamorphism which produced it followed the appearance of the igneous rocks, and that it must have been produced in both at the same time.

**Late Precambric igneous rocks.** Dikes of two sharply contrasted sorts of rocks are of frequent occurrence in parts of the Adirondack region, cutting all of the rocks so far described. They are of all widths up to over 100 feet, though those wider than 30 or 40 feet are exceptional, and few reach those dimensions. The larger number have an approximate east and west trend and are nearly vertical. The more common dikes are of a black, flinty, basic rock, diabase; the others are more variable, but are usually quite acid, red, porphyritic rocks of syenitic make-up.

They are much more abundant in the northeast than in any other part of the region, being exceedingly numerous in Clinton county and northern Essex, so much so that, if massed together, it would be at once evident that they constitute a very respectably large portion of the whole rock mass. Somewhat less than half of Clinton county has Precambric surface rocks, yet some 130 of these dikes are known in the county and there are doubtless many more. Rand hill, Dannemora mountain and the shores of Upper Chateaugay lake may be mentioned as localities where they are exceedingly numerous. Followed to the south and west, they rapidly diminish in number and become rare or wholly absent. Thus Kemp reports many from Essex county, mainly in the north, but very few from Washington and Warren. Franklin county is much larger and with a proportionate much greater area of Precambric rocks than Clinton, yet only some forty of these dikes have been discovered there, and these mainly in the eastern portion. Though many more doubtless remain undiscovered, the relative abundance can be calculated, and they are six to eight times as abundant in Clinton as in Franklin. In St Lawrence, Hamilton and Herkimer counties they are practically absent, and the few known are toward the northeast. Smyth reports them in comparative abundance in the Thousand islands region on the west border of the district, and a single large dike of diabase is found in the Little Falls outlier on the far south. So far as the present Adirondack region is concerned, the igneous activity of this time centered in Clinton county, dying out toward the south and west. As to the extension northward and eastward, nothing can be stated, since the Precambric rocks pass under a paleozoic cover in those directions. Diabase dikes are however fairly abundant in Canada in the region beyond this cover.

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[1] *Op. cit.* p.11J-12J.

[2] *U. S. Geol. Sur.* 16th An. Rep't, pt. 1, p.773.

The centering of the activity in Clinton county becomes the more apparent when the distribution of the two varieties of the dikes is taken into consideration, the red, syenite dikes being practically confined to that county. They are far less numerous and of much more restricted distribution than the diabases. Only 26 dikes of this class have been noted, of which 19 are on Rand hill, where exposures are numerous and detailed work has been done. No doubt there are many others elsewhere, but it seems quite certain that they are practically confined to the county, only one having been noted outside its limits, and that in Franklin not far from the boundary. Even on Rand hill the diabases much outnumber them. The display of dikes there is the most impressive known in the Adirondack region. If any volcanos were built at the time, surely the roots of one gigantic one are here.

As has already been stated, these rocks are found at the present time only in dikes. We see the channels through which the material ascended, but can not be sure whether any reached the land surface of the time, giving rise to true volcanic action, nor do we anywhere get a glimpse of the underlying reservoirs which supplied the material, since erosion has nowhere cut deeply enough to disclose them. It may well be, therefore, that the mere dikes give little idea of the possible importance of this period of igneous activity. But, if great surface flows occurred, or volcanos were formed, it seems strange that no vestiges of their presence remain, since, as has been stated, the character of the dikes themselves does not indicate any very great amount of erosion of the present surface as compared with that of that time. The most of the erosion since has been expended on the paleozoic cover which subsequently overspread this old land surface.

These dikes apparently owe their existence to the same causes which were responsible for the earlier, great intrusions, and mark the last paroxysm of igneous activity from that source. They are wholly unmetamorphosed and are the only Precambric rocks in the region of which this is true. Moreover, in cooling, the chilling influence of the walls has been very marked, indicating comparatively near surface conditions at the time. The borders of even the largest dikes have cooled so rapidly as to be glassy, though the rock may become quite coarsely crystalline toward the center. Little or no trace of such strong, chilling effect is to be found in the older dikes of the region. Occasionally the dikes are even somewhat amygdaloidal, which is also indicative of cooling at no great depth. These characters point conclusively to a much younger age for these dikes. Their time of appearance was not only subsequent to the great metamorphism of the region, but was near the close of the following long period of Precambric erosion. Before their appearance the rocks which they cut had had the greater part of the overlying load of material which covered them during metamorphism, laboriously pared away by the slow processes of erosion, a depth of erosion being involved which necessarily argues the lapse of a vast interval of time.

These rocks are very similar to those of the igneous outflows which characterized Keweenawan time (supposedly late Precambric) in the upper Great lakes region, and it is thought that they are of approximately the same age.

In only one case has it been possible to make a relative age determination between the two sets of dikes. Near the summit of Rand hill a 15 inch dike of the syenite porphyry, bearing n.65°e., is cut by a diabase dike of the same width bearing e. and w. In this case the diabase is indisputably the younger. While this does not demonstrate that all the diabase is younger than all the syenite porphyry, it at least points strongly to such a conclusion.

*Syenite porphyries.* The rocks from the various dikes differ considerably. Nearly all of them show porphyritic feldspars, though with much variation in size and abundance. These are usually red, but become greenish in one dike, and in another are of a red violet hue. Except in one dike this is the only porphyritic mineral, biotite also appearing in this case. The dikes are often of pronounced red color, but some are much darker, gray to black, with often a greenish tinge when slightly altered. The narrower dikes are dense, hard rocks with conchoidal fracture and aphanitic appearance and general red color. The larger ones are equally hard and firm, but coarser grained and less apt to be red.

These rocks are essentially composed of microperthitic feldspar and biotite, with accessory magnetite (or specular hematite), hornblende, quartz, albite, orthoclase, microcline, apatite and titanite, and with secondary chlorite, calcite, muscovite, epidote and hematite. Microperthite and chlorite, the latter from biotite alteration, are the only minerals present in all the dikes. Quartz is present in most of them, in quantity varying with the composition. The ground-mass has in general a well marked flow (trachytic) structure.[1]

They show a surprising range in composition considering their rather constant mineralogy, varying from the acidity of granites to, in the case of one dike, a basicity approaching that of basalt.

*Diabases.* The numerous dikes of this rock in the Adirondacks exhibit many variations in composition and texture, and on the northern slopes of the north foothills of the region, where glacial erosion was powerful and all weathered rock was swept away, they are often found in beautifully fresh condition. They have not, as yet, received the thorough description which they merit, Kemp's account of them being the most exhaustive which has yet appeared.[1]

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[1] For detailed description, see Geol. Soc. Am. Bul. 9:239–56.

The usual diabases consist essentially of a plagioclase feldspar, mostly either andesin or labradorite, augite and magnetite. To these olivin must be added in a very large portion of the dikes, the number of olivin diabases equaling or exceeding that of those without this mineral, so far as the writer's observation goes.

The smaller dikes are, almost without exception, porphyritic, and the same is true of at least the borders of the larger ones, though these frequently become sufficiently coarse grained in their central portions to cause this character to lose its distinctness. As a general proposition, the dikes may be said to be characterized by two generations of one or more of the minerals present, sometimes the feldspar alone, sometimes the augite alone, sometimes both, occurring in this way. The olivin, when present, seems always to belong to the first generation.

Three of the Franklin county dikes are notable in containing an orthorhombic pyroxene, bronzite, in considerable quantity. It is porphyritic in all, and with its coming in, olivin retreats. In two of them, it gives rise to beautiful parallel growths with augite of a certain sort, nearly all the bronzites being bordered by a narrow zone of this mineral, after the usual law of such growths. The augite plainly did not begin to form till the period of bronzite formation had passed, and the crystals furnished nuclei favoring augite growth.

In some 25% of the dikes biotite is present, occurring in frequent small scales in the ground-mass, with a notable tendency to border the magnetite crystals. In such situation it has been sometimes regarded as primary and sometimes as a result of magnetite feldspar corrosion. Kemp looks on it as the former, in the Essex county dikes. The writer has been unable to satisfy himself as to which view is the proper one, in the case of his own dikes, though disposed to the latter view.

That these rocks show a notable range in composition is indicated by the considerable variation in the relative amounts of feldspar and augite, the former being very materially in excess in some of the rocks and the latter predominating in others. The olivin diabases are in general less feldspathic than those in which that mineral is lacking. Much variation in structure is also shown which, to a considerable degree at least, depends on composition. The ophitic structure is the more usual one. In many of the dikes, however, the interspaces between the feldspar laths are filled by clumps of smaller augites, instead of the large augites which solidly fill the interspaces in the typical structure. In the more feldspathic dikes the interference of the different feldspar laths with one another, and their abundance much hinder the development of the normal structure.

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[1] *U. S. Geol. Sur.* Bul. 107, p.24-27.

In many of the dikes there is a more or less well marked tendency on the part of the feldspar laths to assume a radial grouping around various centers, giving rise to the divergent rayed structure. In some such the augites also tend to a long prismatic, or lath, shape, and these may take on an independent radial grouping also. A tendency on the part of the augites to show their own crystal boundaries is found in many of these rocks, as Kemp has shown, producing a grading toward camptonite.

### Chemical analyses and discussion

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| $SiO_2$ ... | 43.41 | 44.51 | 45.46 | 46.73 | 50.89 | 52.53 | 63.02 | 67.16 | 68.96 |
| $Al_2O_3$ ... | 19.42 | 19.99 | 19.94 | 16.66 | 15.39 | 18.31 | 14.87 | 14.53 | 15.25 |
| $Fe_2O_3$ .. | 5.72 | 7.22 | 15.36 | 3.56 | 5.77 | .34 | 6.53 | 4.17 | 3.28 |
| FeO ... | 6.691 | | | 8.45 | | 6.43 | none | | none |
| MgO ... | 5.98 | 8.11 | 2.95 | 8.12 | 7.6 | 1.82 | .95 | .41 | .2 |
| CaO ... | 9.11 | 8.15 | 8.32 | 8.03 | 8.75 | 3.15 | 1.12 | 1.26 | .76 |
| $Na_2O$ ... | 4.39 | 5.24 | 2.12 | 3.73 | 5.67 | 7.26 | 5.85 | 5.55 | 5.45 |
| $K_2O$ .... | .47 | 2.6 | 3.21 | 1.64 | 2.72 | 6.47 | 5.62 | 6.1 | 5.01 |
| $H_2O$ .... | 3 | 2.93 | 2.3 | 2.39 | 2.46 | 1.16 | 1.45 | 1.1 | .91 |
| $TiO_2$ ... | .35 | ..... | ..... | .03 | ..... | ..... | ..... | ..... | ..... |
| $P_2O_5$ ... | ..... | ..... | ..... | .39 | ..... | 1.59 | ..... | ..... | ..... |
| Cl ..... | ..... | ..... | ..... | .18 | ..... | .4 | ..... | ..... | ..... |
| F ...... | ..... | ..... | ..... | .26 | ..... | .32 | ..... | ..... | ..... |
| $Cr_2O_3$ .. | ..... | ..... | ..... | .06 | ..... | ..... | ..... | ..... | ..... |
| MnO ... | ..... | ..... | ..... | trace | ..... | .15 | .46 | ..... | .23 |
| BaO ... | $CO_2$ 2 | ..... | ..... | .04 | ..... | ..... | ..... | ..... | ..... |
| Total .. | 100.54 | 98.75 | 99.66 | 100.2 | 99.25 | 99.93 | 99.87 | 100.28 | 100.05 |
| O=Cl & F.... | | | | .14 | | .22 | | | |
| | | | | 100.06 | | 99.71 | | | |

**1 Diabase from summit of Mt Marcy, Essex co. Analyst Leeds. N. Y. State Mus. 30th An. Rep't, p.102.**

**2 Diabase from shore of Upper Chateaugay lake, Clinton co. Analyst Eakle. Am. Geol. July 1893, p.35.**

**3 Diabase from Palmer hill, Black Brook township, Clinton co. Analyst Kemp. U. S. Geol. Sur. Bul. 107, p.26.**

**4 Olivin diabase, Bellmont township, Franklin co., dike 13. Analyst Morley. 18th An. Rep't N. Y. State Geol. p.120, and 20th An. Rep't, p.r79. Very fresh, olivin not perceptibly serpentinized.**

**5 Olivin diabase from shore of Upper Chateaugay lake, Clinton co. Analyst Eakle. *Op. cit.* p.35.**

**6 Very basic syenite porphyry, Rand hill, Clinton co. Analyst Morley. Geol. Soc. Am. Bul. 9:248.**

**7 Normal syenite porphyry, Rand hill, Clinton co. Analyst Morley. *Op. cit.* p.248, and 20th An. Rep't N. Y. State Geol. p.r79.**

**8 Syenite porphyry from shore of Upper Chateaugay lake. Analyst Eakle. *Op. cit.* p.34.**

**9 Acid syenite porphyry, Rand hill, Clinton co. Analyst Morley. *Op. cit.* p.248 and r79.**

The analyses quoted above are all that are known to the writer of these rocks. Many of them are quite old but are valuable for comparative purposes, though not going into the minutiae of modern requirements. The diabases show considerable variation, as would be expected, yet on the whole harmonize well with one another. No. 4 is the only tolerably complete analysis, and at the same time seems to represent about a mean between the extreme types and will hence serve as a fair representative of the average diabase of the district. It consists essentially of labradorite and augite in about equal amounts, with considerable olivin and magnetite and a rather unusual amount of biotite, much of which is clearly primary. Apatite is about the only other mineral. The magnetite is only slightly titaniferous, if at all, since the very small amount of titanium present may likely all be in the biotite. The augite is in two generations, but the feldspar not. The structure is only poorly ophitic.

No. 1 is the rock long ago analyzed by Leeds, the analysis not being accompanied by any description however. Augite is the only mineral specifically stated to be present.

No. 2, according to Eakle, appears to lack olivin, and the augite is almost wholly altered to chlorite and epidote. No. 5, according to the same author, is an ordinary olivin diabase, though he makes no mention of augite, and it is only inferentially supposed *to be present.* It is noteworthy in being exceptionally acid for these rocks, though the description does not suffice to bring out the cause for this extra acidity.

No. 3, Kemp's Palmer hill rock, is exceptional for the region in that the feldspar is altered to scapolite, and it falls badly out of the series in several respects, notably in its low magnesia and its excess of potash over soda.

The rocks from which analyses 6, 7 and 9 were made, were selected to represent the mean and the extreme phases of the syenitic dikes. No. 6 is much more basic than any other of these rocks known in the region, a silica determination of the one which seemed to approach it most closely showing 59.2%. From this figure to the 68.96% of no. 9 there is apparently no break in the series.

This basic rock consists essentially of feldspar, a portion of which is microperthite and the remainder albite, biotite, apatite and a little magnetite, these in order constituting 61%, 33%, 4% and .5% of the rock. Except for the absence of quartz these are the same minerals which characterize the other dikes, thus indicating the genetic connection of this rock with the others.

No. 7 consists of feldspar, largely microperthite, chloritized hornblende, magnetite and quartz, with a little apatite and much hematite stain. There is about 10% of hornblende and somewhat less than that amount of quartz in the rock, practically all the remainder being feldspar. Except that in most of the dikes the hornblende is replaced by biotite, this is rather closely the average composition of all.

The rock of column 9 is composed of microperthite, quartz and specular hematite, with exceedingly slight amounts of chlorite and apatite. The feldspar makes a little under 80%, the quartz a little over 17% and the hematite a little over 3% of the rock. The feldspar is very typical microperthite or anorthoclase, composed of orthoclase and albite in the proportion of 2:3.

The likelihood that the material of these dikes was derived from the same magmatic source as that of the earlier great intrusions is strongly suggested by a comparison of analyses.

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $SiO_2$ | 47.42 | 46.73 | 63.45 | 63.02 | 68.5 | 68.96 |
| $Al_2O_3$ | 17.34 | 16.66 | 18.38 | 14.87 | 14.69 | 15.25 |
| $Fe_2O_3$ | 4.91 | 3.56 | .42 | 6.53 | 1.34 | 3.28 |
| *FeO* | 10.22 | 8.45 | 3.56 | none | 3.25 | none |

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| MgO | 5.21 | 8.12 | .35 | .95 | .26 | .2 |
| CaO | 8.09 | 8.03 | 3.06 | 1.12 | 2.2 | .76 |
| $Na_2O$ | 3.48 | 3.73 | 5.06 | 5.85 | 3.5 | 5.45 |
| $K_2O$ | 1.89 | 1.64 | 5.15 | 5.62 | 5.9 | 5.01 |
| $H_2O$ | 1.13 | 2.39 | .3 | 1.45 | .4 | .91 |
| $TiO_2$ | 3.6 | .03 | .07 | ...... | ...... | ...... |
| $P_2O_5$ | .06 | .39 | ...... | ...... | .03 | ...... |
| Cl | .21 | .18 | ...... | ...... | ...... | ...... |
| F | ...... | .26 | ...... | ...... | ...... | ...... |
| $Cr_2O_3$ | ...... | .06 | ...... | ...... | ...... | ...... |
| MnO | .06 | trace | trace | .46 | .1 | .23 |
| BaO | .04 | .04 | .13 | ...... | .05 | ...... |
| Total | 100.06 | 100.2 | 99.73 | 99.87 | 100.22 | 100.05 |
| O=Cl & F | .05 | .14 | | | | |
| | 100.01 | 100.06 | | | | |

1 Gabbro (hyperite) from near Nicholville, St Lawrence co.; no. 2 of first table of analyses.
2 Diabase. Bellmont township, Franklin co.; no. 4 of second table.
3 Augite syenite, Loon lake, Franklin co.; typical; no. 11 of first table.
4 Normal syenite porphyry, Rand hill, Clinton co.; no. 7 of second table.
5 Quartz augite syenite, near Willis pond, Franklin co.; no. 14 of first table.
6 Quartz syenite porphyry, Rand hill; no. 9 of second table.

A comparison of the first two of the above analyses shows a very close agreement between the gabbro and the diabase in composition, the most striking discrepancy being in the titanium percentage. This difference is perhaps sufficiently pronounced to throw some doubt on the magmatic relationship, since in other respects the analyses might be duplicated from many parts of the earth's surface, both gabbros and diabases of this approximate composition being among the most widespread of igneous rocks. If this high titanium percentage was characteristic of the rocks of the big intrusions, it should appear in the diabases, also if they are congenital. But, so far as the analyses go, they do not indicate a high titanium percentage in the big intrusions except in the basic gabbros, and most of the analyses which have been made of them are from specimens taken from the wall rocks of titaniferous ore bodies, which are segregations from the magma which are extra rich in iron and titanium. It is therefore thought likely that this difficulty in the way of ascribing magmatic relationship is more apparent than real.

The syenite porphyries are somewhat lower in lime and higher in alkali percentage than the corresponding syenites. But the differences are not thought to be sufficiently large to condemn a reference to the same parent magma.

### Paleozoic rocks

**Potsdam (Cambric) sandstone.** Lying uncomformably on the old and much eroded Precambric surface, a great sandstone formation appears, on the north and east and on the eastern half of the southern border of the Adirondack region. This is a water-deposited formation, and, so far at least as its upper portion is concerned, a marine formation. It is thickest on the northeast, thinning out to disappearance both to the south and west. As, furthermore, it appears to be the upper beds which persist, and the lower ones which disappear in these directions, it seems certain that, so far as the immediate region is concerned, the marine invasion came on it from the northeast and extended progressively southward and westward.

In Clinton county, where the formation is thickest, the basal portion is rather sharply differentiated from the rest in character, and this portion has considerable thickness, though how much, and how large a part of the whole thickness it constitutes, is wholly uncertain. The writer was the first to show this, and it has lately been reaffirmed by van Ingen.[1] This portion consists in part of coarse basal conglomerates, in part of poorly indurated sand beds of small durability and in smaller part of thoroughly indurated sandstones. It is nearly everywhere characterized by a considerable feldspar content, in addition to the quartz, and this feldspar is for the most part fresh. Considerable magnetite also appears in places, along with grains of garnet and occasional zircons. The rock has therefore an arkose character in this portion, while above it is prevailingly of pure quartz sand. Red is the predominant color of the base, and there is but little white sandstone in it, while above the latter is the prevailing color. As a general proposition, a feldspar content and a prevalence of red beds go together and are certain signs of the basal portion.

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[1] N. Y. State Mus. Bul. 52, p.543.

Basal conglomerates are a prominent feature in Clinton county wherever the proper horizon is exposed. For the most part these are not extra coarse, the larger pebbles seldom exceeding an inch in diameter. The pebbles are prevailingly or exclusively of quartz, derived from the quartz veins of the Precambrian rocks, and are embedded in a coarse sand matrix in which there is a large feldspar, and considerable magnetite content. Along most of the northern border the general lack of pebbles of the underlying rocks, which are mostly Saranac gneisses, is indicative of quite prolonged wear of the material, so that only the extraresistant pebbles of vein quartz origin were sufficiently durable to persist as pebbles. The undecayed character of the feldspar grains of the sands in these conglomerates indicates that all soil and largely weathered rock had already been removed and carried offshore to be deposited, and that the waves were working on tolerably fresh rock, whose grinding to sand had to be performed by water action alone, unaided by any special weakness due to previous weathering.

In some few localities conglomerates indicative of much less vigorous wave action are found. These contain numerous pebbles of the underlying gneisses, often of large size and showing great variation in size, and quartz pebbles are much less conspicuous or lacking. These seem to be purely local deposits laid down in sheltered hollows in the Precambric floor, whose presence is likely due to uneven depth of weathering of the floor rocks. It is in rocks such as these that the pebbles of diabase and syenite porphyry which demonstrate the Prepotsdam age of these dikes, are found. Such conglomerates are much less resistant rocks than the commoner quartz pebble conglomerates, and present exposures usually show them in much disintegrated condition.

These heavy basal conglomerates are mainly confined to the northern border of the region, extending as far west as eastern St Lawrence county. South of Clinton county, along Lake Champlain, their existence is rather problematic, owing to dearth of exposures of the proper horizon, mainly due to faulting.

An interesting outcrop of basal conglomerate occurs not far west of Keeseville in Clinton county, nestling in an indentation in the eastern edge of the anorthosite gabbro, the actual contact not showing. It is capped by red, feldspathic sandstones of the ordinary basal type. The conglomerate carries numerous quartz pebbles, up to 2 inches in diameter, along with occasional smaller ones of diabase, and of red orthoclase feldspar, the latter clearly from pegmatite veins. The coarsely granular matrix looks black when fresh, becoming green mottled with blotches of chloritic material on weathering. Along with the quartz in the matrix is much microperthite feldspar, considerable magnetite in streaks, and occasional grains of titanite and microcline, all these grains being surrounded by a greenish, chloritelike cement, whose exact nature is not clear.

This conglomerate represents an intermediate stage between the normal, quartzose conglomerates and the local, disintegration conglomerates of the hollows. It is therefore of interest to note that, while it lies in contact with anorthosite gabbro, with no gneissic outcrops within a mile, it is entirely made up of gneissic debris. This may either argue transportation of the materials for at least this distance, which would imply great strength of wave action; or else that gneiss occurred near at hand along the old shore, became covered up by later Potsdam beds, and has since been faulted out of sight. There is no question about the necessary fault being near at hand, and, so far as the writer knows, no evidence which will enable a decision one way or the other.

Very abundant also in the basal portion of the formation, are beds of rapidly disintegrating, very red, coarse arkose sandstones, made up mainly of quartz and feldspar grains and the whole much permeated with red hematite. They break down rapidly to a red, sandy clay, a characteristic soil which is produced by no other rock in the district, and which often shows the presence of these beds when actual outcrops are lacking. Beds of this sort often occur interbanded with the basal conglomerates, or they may constitute the larger part of the base, conglomerates being scarce or absent, as is the case on Rand hill, where these beds show greater bulk than in any other known locality.

Well indurated, red sandstones, such as those from the type locality at Potsdam, are not infrequent in the basal portion of the formation and are numerously exposed at various localities on the north border of the Adirondacks in such situation as to indicate clearly their horizon. At Potsdam itself the section is complicated by faulting, and the horizon of the red sandstone there can not be demonstrated, though inferentially it is low in the formation. Along with the red there is much hard, glassy, brown sandstone, also containing fresh feldspars, but lacking the hematite coloration of the red beds. Above, the reds become striped and mottled with white, forming a species of passage beds to the middle division.

Van Ingen is the only observer who has undertaken to differentiate between the middle and upper portions of the Potsdam. He says:

> The middle portion of the sandstone is made up of well sorted materials, of finer grain, compactly cemented, and of white, steel gray or yellowish color, with very little or no feldspathic content. The grains of sand are both angular and rounded, with the former predominating. The layers are more regular, though their surfaces are ripple-marked, and in section they are seen to be almost universally cross-bedded. Pebbles are found on the surfaces of some layers of the middle portion, but unlike those of the upper portion they seem to have been of soft mud derived by erosion of contemporaneous sediments, cast on the beach at times of rough water and flattened and squeezed out by the subsequent pressure and consolidation of the superimposed sand deposits.
>
> The upper portion of the formation has frequent beds of irregular laminated sandstone, with partings of greenish arenaceous shale. The shale surfaces are covered with fucoids and worm trails. Pebbles of shale and dolomite, which were hardened before the time of their entombment, are found embedded in the sandstone layers, and their disintegration causes cavities to form in the layers containing them. The dolomite pebbles become more abundant toward the upper horizons. In the upper levels frequent beds are composed of nicely rounded grains of clear quartz with a little cement, that crumble to a sugary powder under the hammer. Rounded grains of quartz of a slightly larger size occasionally cover the upper surface of a layer of finer grained sandstone, and, being without cement, they stand out in relief above the surface with an appearance of having been sprinkled from a pepper pot.[1]

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[1] *Op. cit.* p.543–44.

While these differences are by no means so obvious as those which serve to separate the basal beds from the remainder of the formation, they are sufficiently distinct to enable one to recognize the horizon dealt with in good exposures, provided the extension of van Ingen's work over a larger area shows them to be persistent. The writer's work in the district has been mainly that of hurried areal mapping, and is not therefore of sufficiently detailed character to enable him to express an opinion of any value on this work of van Ingen's, though, so far as it goes, he is disposed to coincide. Precisely the same differences which van Ingen notes have been observed, but the work was not done in sufficient detail to warrant publication. In addition it may be stated that frequent pebbly beds occur throughout the formation, in which the pebbles are almost exclusively of white quartz, with a tendency to concentration on the upper surfaces of layers which are otherwise of pure sand, instead of being disseminated through the layer. Such pebbly horizons seem much more characteristic of the middle division than of the upper.

The thickness of the Potsdam in Clinton county is unknown. The thickest measured section is that in the Ausable chasm, but the section there is complicated by faulting and is by no means complete, all the basal portion being lacking. Walcott's measurement gives 350 feet, and van Ingen's "at least 455 feet" as the thickness here. In the Morrisonville well, with the drill resting at 1250 feet in the Potsdam sandstone, at least 750 feet of the formation had been drilled through, and the bottom samples were of clear, glassy quartz sand, with no trace of the feldspars which characterize the basal portion, indicating that it had not been reached.[1] From this record alone it seems perfectly safe to say that the formation has a thickness considerably in excess of that amount in Clinton county. The writer's estimate, based on the broad belt of outcrop in the northern part of the county, assigns a minimum thickness of at least 1,000 feet to the formation, with a likelihood that it is considerably in excess of that amount.

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[1] *19th An.* Rep't State Geol. p.r69.

Van Ingen's study of the Saranac river section of the Potsdam, extending along the river for 2 miles above and below Cadyville, leads him to compute the thickness there shown at 1150 feet.[1] The writer agrees with him that there is no evidence of faulting in this section, though he believes that it is terminated by a fault at each end. Certainly one of the biggest faults in the district, the Tracy brook fault, crosses the river somewhere between the lower end of the section and Morrisonville, though apparently with much diminished throw hereabouts. The Potsdam is a most difficult formation on which to get accurate dip measurements, and the writer's notes give the dip as somewhat less than that stated by van Ingen, averaging about 5° instead of between 5° and 10°, as given by him, which would cut down the above thickness by some 300 feet. Whichever result be the more correct, the thickness is impressive, since the basal beds do not show, nor is the summit reached. Basal beds do indeed occur in the near vicinity, showing in frequent outcrop on the higher ground a mile south of Cadyville. These are on the strike of the river exposures and at a higher altitude, yet belong much below them stratigraphically, and the writer is disposed to the conclusion that a fault intervenes between the two, likely a branch from the Tracy brook fault. These beds show considerable thickness, and it is thought highly probable that the thickness of the whole Potsdam is more likely over, rather than under 1500 feet.

The paleontologic and stratigraphic work of Walcott and van Ingen has shown that the upper portion of the formation, through a thickness of some 350 feet, carries a sparse Upper Cambric fauna. With the exception of a few supposed tracks, of uncertain nature, no fossils have so far been found in all the remainder of the formation, and there is therefore an utter lack of paleontologic evidence as to its age, and the possibility that the lower portion may be older than the Upper Cambric must be conceded. But it seems to the writer that, fossil evidence being lacking, the formation as it occurs in New York is not susceptible of subdivision. The basal rocks grade into those of the middle division, as do those into the upper, and there is no marked structural break at any horizon which would warrant the assumption of any great difference in age between base and summit, or any marked pause in sedimentation. Prof. N. H. Winchell has long held, and has recently reiterated the view, that the typical Potsdam at Potsdam is much older than the upper, white, less indurated beds, and he classes it in the middle Cambric and correlates it with a portion of the Keweenawan of the upper lake region.[1] As above indicated, the writer's judgment is that any present attempt to divide the formation on the basis of age is premature and has but slender basis of fact, considering the lack of all evidence from fossils.

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[1] *Op. cit. p.532.*

As has been shown by many observers, the transition from Potsdam to Beekmantown sedimentation is not a sharp one but through a series of passage beds. Near the summit of the former, thin beds of gray dolomite make their appearance, interbanded with the soft, white sandstones which prevail there, increase in frequency till they constitute half the mass of the rock, and finally prevail and cut out the sandstones altogether. The sandstone layers are characteristically Potsdam in appearance, and the dolomites as characteristically Beekmantown. There is no mixing of materials but rather a rapid alternation of two contrasted sets of deposition conditions. Walcott has measured a thickness of 25 feet of such passage beds along the Chateaugay river and 70 feet near Whitehall. In the writer's judgment, the latter is much nearer the usual figure than the former. These beds are exposed at many localities along the northern border of the region, but seldom suitably for measurement of thickness. They seem usually of considerable bulk.

**Beekmantown (Calciferous) formation.** Just as in the case of the Potsdam beneath, the Beekmantown formation is thickest on the northeast margin of the Adirondack region and thins out to the west and south, though the thinning is less rapid, so that the formation extends much beyond the limits of the Potsdam, being lacking only on the west side of the region. The type locality is at Beekmantown, Clinton co., where the formation is very fossiliferous, but where the section is quite incomplete; in fact, there is no one locality in Clinton county where anything like a complete section of the formation can be obtained.

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[1] Am. Geol. April 1903, p.246-49.

For such sections recourse must be had to the district nearer the upper end of the lake. Here the dips are steeper, and there are two localities in Shoreham Vt, where the full section is shown, and the section about Fort Ticonderoga is quite complete also. These sections have been studied in detail by Brainard and Seeley, and the results obtained there applied to other parts of the Champlain region.[1] No other work approaching this for detail and accuracy has been done on the formation in the Champlain region. In their type section at Shoreham they have recognized five subdivisions of the formation, as follows:[2]

| | Feet |
|---|---|
| A Dark iron-gray magnesian limestone, usually in beds 1 or 2 feet in thickness, more or less silicious, in some beds even approaching a sandstone. Nodules of white quartz are frequently seen in the upper layers, and near the top large irregular masses of impure black chert, which, when the calcareous matter is dissolved out by long exposure, often appears fibrous or scoriaceous. Thickness | 310 |
| B Dove-colored limestone, intermingled with light gray dolomite in massive beds; sometimes for a thickness of 12 or 15 feet no planes of stratification are discernible. In the lower beds, and in those just above the middle, the dolomite predominates; the middle and upper beds are nearly pure limestone; other beds show on their weathered surfaces, raised reticulating lines of gray dolomite. Thickness | 295 |
| C, 1 Gray, thin bedded, fine grained, calciferous sandstone, on the edges often weathering in fine lines, 40 or 50 to the inch, and resembling close grained wood. Weathered fragments are frequently riddled with small holes, called Scolithus minutus by Mr. Wing | 60 |
| 2 Magnesian limestone in thick beds, weathering drab | 100 |
| 3 Sandstone, sometimes pure and firm, but usually calciferous or dolomitic | 70 |
| 4 Magnesian limestone like no. 2, frequently containing patches of black chert | 120 |
| Thickness of C | 350 |

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[1] Am. Mus. Nat. Hist. Bul. 3:1-23.

[2] *Op. cit. p.2-3.*

| | Feet |
|---|---|
| D, 1 Blue limestone in beds 1 or 2 feet thick, breaking with a flinty fracture, often with considerable dolomitic matter intermixed, giving the weathered surface a rough, curdled appearance; becoming more and more interstratified with calciferous sandstone in thin layers, which frequently weathers to a friable, ocherous rotten stone.... | 80 |
| 2 Drab and brown magnesian limestone, containing also toward the middle several beds of tough sandstone.. | 75 |
| 3 Sandy limestone in thin beds, weathering on the edges in horizontal ridges one or two inches apart, giving to the escarpments a peculiar, banded appearance. A few thin beds of pure limestone are interstratified with the silicious limestone.................................. | 120 |
| 4 Blue limestone in thin beds, separated from each other by very thin, tough slaty layers, which protrude on the weathered edges in undulating lines. The limestone often appears to be a conglomerate, the small inclosed pebbles being somewhat angular and arenaceous........ | 100 |
| Thickness of D................................ | 375 |
| E Fine grained, magnesian limestone in beds 1 or 2 feet in thickness, weathering drab, yellowish or brown. Occasionally pure limestone layers occur, which are fossiliferous, and rarely thin layers of slate. Thickness.......... | 470 |
| Total thickness.................................. | 1800 |

*Cassin formation.* In the upper part of division D and in division E are numerous fossiliferous horizons carrying a rather abundant fauna. These beds are confined to the Champlain valley so far as the immediate region is concerned, and have therefore the same restricted distribution as the following Chazy. In discussing Brainard and Seeley's paper, Professor Whitfield recognizes and emphasizes this point and the considerable differences between these upper beds and the ordinary, sparingly fossiliferous character of the normal Beekmantown. He urges the similarity of the fauna to that of the Quebec group of Canada, argues that these beds have more natural affinity with the Chazy than with the

Beekmantown, and that they should either be placed with that formation or else considered as distinct from either and given a separate name, "as Fort Cassin, or Philipsburg formation, or any other appropriate name."[1] This seems to the writer not only an eminently proper, but really a necessary procedure. The thickness and importance of this group, consisting of the upper 220 feet of division D and the whole of E, is such as definitely to warrant its separate mapping in the Champlain region, and the writer proposes the name "Cassin formation" for it, to make Whitfield's suggestion more precise and definite. The question as to whether the rocks involved are to be classed with the Chazy or with the Beekmantown, or with neither, is not at issue in the giving of the name, the point made being simply that we have here several hundred feet of limestone of definite lithologic and paleontologic character, whose definiteness and importance would seem to warrant its separate recognition and mapping as a substage. In the type section, at Beekmantown, the rocks of this upper horizon are not exposed. The matter will be reverted to on a subsequent page in considering the subdivisions of the Chazy limestone.

When the Beekmantown formation is followed to the south and around into the Mohawk valley, it is found to be much thinner than in the Champlain region, and the upper portion, that which has been separated above as the Cassin formation, is wholly wanting. Prosser has carefully measured a number of sections in this region, but measurements of the full thickness can rarely be made because the formation is seldom cut through to its base, and because it overlaps on the Precambric, thus not presenting its full thickness close to the Precambric border. At Little Falls the formation is 456 feet thick. The deep wells at Ilion and Utica, a few miles farther west and at a somewhat greater distance from the Precambric edge, show a somewhat, but not greatly increased thickness. Eastward from Little Falls the sections in the valley do not get down to the base of the formation, except at Spraker, where Prosser measured a thickness of 500 feet, with the summit not exposed, but the thickness does not vary greatly apparently, though showing some diminution east of

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[1] Am. Mus. Nat. Hist. Bul. 3:27–28.

Spraker. The upper beds contain Ophileta and seem of about the same age as the basal part of division D of Brainard and Seeley's section. The upper Cassin beds are wholly lacking in the Mohawk valley, and apparently the latter region was uplifted while they were being deposited on the east. Certainly, the connection between the two areas was broken during this time, confining the Cassin fauna to the Champlain basin, and this seems to the writer an added reason for the separation of the Cassin beds from the normal Beekmantown.

On the north side of the Adirondacks the exposures of the formation are poor and infrequent, the dips are flat, and the breadth of outcrop considerable, with the full thickness not showing on the New York side of the international boundary. Nothing definite is known concerning the thickness in this area, but, as its western limits are reached, in the Thousand islands region, it becomes evident that the formation has greatly thinned. On the western side of the region it is wholly absent, the later Black River and Trenton limestones resting directly on the Precambric, making it perfectly evident that the Beekmantown shore line there lay farther to the west than the present Precambric boundary. Moreover, the imperfect records of the gas wells of Oswego and Jefferson counties, as given by Orton, indicate a thickness of only 200 feet of Beekmantown rocks under cover in the former county, and none at all in the latter, the former wells being 35 miles, and the latter 15 miles distant from the present Precambric boundary.[1] It seems therefore that the Beekmantown sea covered by no means all of the present Precambric region of northern New York, and that the main area left unsubmerged by its waters was on the west and south. On the west the shore was several miles west of the present Precambric edge; on the south it did not extend in more than from 10 to 30 miles beyond the present edge, as the writer has elsewhere shown;[2] much less is known about the rate of overlap on the northeast, but the great thickness of both the Potsdam and Beekmantown formations there would indicate that, by the close of the Beekmantown, the sea must have widely encroached on that portion of the region.

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[1] N. Y. State Mus. Bul. 30, p.442, 458.

[2] *N. Y. State* Mus. Bul. p.77.

**Chazy formation.** The Chazy rocks are found, at the present day, only on the eastern border of the Adirondack region. Their present distribution gives but little idea of the extent of the sea in which they were deposited, which must have encroached widely over the present northeastern portion of the Adirondacks, from which the deposits have been since removed by erosion. But the formation is wholly lacking on the remaining sides of the region, and can not have been laid down there at all. On the contrary, the Beekmantown land area of the southern and western parts of the region became greatly extended in those directions, shutting out the sea altogether, and leaving merely the eastern area submerged during this time.

Much detailed study has been given the Chazy formation throughout the Champlain valley by Brainard and Seeley.[1] For stratigraphic detail and accuracy this work can not be improved on. It shows that the formation is thickest in the latitude of southern Clinton county; that it rapidly thins southward to utter disappearance at the upper end of Lake Champlain; and that it also thins northward and moreover changes considerably in character in this direction.

Throughout most of the Champlain valley the formation consists essentially of beds of quite pure, clear water limestones, with a surprisingly small amount of land wash of any sort, in itself an indication of considerable width for the basin, much beyond what the present breadth of outcrop would indicate. The formation is thickest on Valcour island, and Brainard and Seeley's measured section there is here reproduced.

Group A (Lower Chazy)

| | | Feet |
|---|---|---|
| 1 | Gray or drab sandstone, interstratified with thin (or sometimes thick) layers of slate, and with occasional thin layers of limestone at the base, containing Camerella (?) costata Bill........................ | 56 |
| 2 | The slaty sandstone gradually passes into massive beds, made up of thin alternating layers of tough slate and nodular limestone, containing undetermined species of Orthis and Orthoceras.............................. | 82 |

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[1] Am. Geol. 2:323–30; Geol. Soc. Am. Bul. 2:293–300; Am. Mus. Nat. Hist. *Bul. 8:305–15.*

Feet

3 Dark bluish gray, somewhat impure limestone, in beds of variable thickness; often packed with Orthis costalis Hall, which occurs with more or less frequency through the whole mass. Other fossils are: Lingula huronensis Bill., Harpes antiquatus Bill., H. ottawaensis Bill.(?), Illaenus arcturus Hall, (I bayfieldi Bill.), Lituites sp.(?)... 110

4 Gray, tolerably pure limestone in beds 8 to 20 inches thick, separated by earthy seams, the bedding being uneven. Many layers consist of crinoidal fragments, largely of Paleocystites tenuiradiatus Hall. Near the middle of the mass for a thickness of 10 feet, some of the fragments and small, ovoid masses (Bolboporites americanus Bill.) are of a bright red color. 90

Making for the total thickness of A................ 338

### Group B (Middle Chazy)

1 Impure, nodular limestone containing Maclurea magna Les...................................... 25

2 Gray, massive, pure limestone, abounding in crinoidal fragments ........................................ 20

3 Bluish black, thick bedded limestone, usually weathering so as to show pure nodular masses enveloped in a somewhat impure lighter colored matrix; everywhere characterized by Maclurea magna. Near the middle of this mass for a thickness of about 30 feet, the fossils are silicified and of jet-black color. The more important besides Maclurea, are species of Strophomena, Orthis and Orthoceras........................ 210

4 Dark, compact, fine grained limestone, with obscure bedding, weathering to a light gray. Fossils are infrequent, but at a single locality were collected Orthis perveta Con., O. platys Bill., Leptaena fasciata Hall, Asaphus canalis Con., Cheirurus polydorus Bill., Harpes sp. und., Illaenus incertus Bill., Lichas minganensis Bill., Sphaerexochus parvus Bill., and several undescribed species..................... 20

| | | Feet |
|---|---|---|
| 5 | Bluish black limestone like no. 3, but less pure, containing Maclurea magna Les., Orthis perveta Con., Strophomena incrassata Hall, Orthis disparilis Con., or O. porcia Bill | 75 |
| | Total thickness of B | 350 |

Group C (Upper Chazy)

| | | Feet |
|---|---|---|
| 1 | Dove-colored, compact limestone, in massive beds, containing a large species of Orthoceras, Placoparia (Calymmene) multicosta Hall, Solenopora compacta, and a large Bucania | 60 |
| 2 | Dark impure limestone, in thin beds, abounding in Rhynchonella plena; at the base a bed 4 or 5 feet thick is filled with various forms of Monticulipora or Stenopora | 125 |
| 3 | Tough, arenaceous magnesian limestone, passing into fine grained sandstone | 17 |
| | Total thickness of C | 202 |
| | Aggregate thickness of the Chazy on Valcour island | 890 |

In the same papers the authors show that the diminution in thickness of the formation southward is brought about by disappearance of the lower and upper divisions, so that in the more southerly exposures, only the middle division remains, and that this then rapidly pinches out to disappearance. To the northward the work of the Canadian geologists has shown that the formation rapidly changes in character in that direction, land wash entering much more prominently into its make-up than is the case along Lake Champlain.

It is thus seen that the Chazy is a comparatively local formation, laid down in an arm of the sea which occupied the present line of the Champlain valley, whose upper end limited its waters on the south. Its breadth however, specially on the New York side, was much greater than the present limits of the outcrops would indicate. The southern end of the basin was depressed for a much shorter time than the central portion, and its deposits are of the middle division. While the Chazy was being deposited, the remainder of the State seems to have been mostly above sea level, and either the same conditions obtained during Cassin deposition or else a barrier was developed between the Champlain and Mohawk basins at this time, preventing the Cassin fauna from reaching the latter area. While the writer is not a sufficiently competent paleontologist to appreciate or discuss the relationships or differences of the Cassin and Chazy faunas, it does seem to him that structurally the Cassin is related to the Chazy rather than to the Beekmantown. The uplift which shut off this basin from the waters of the remainder of the State, and then caused those waters to recede beyond the State's boundaries, took place prior to Cassin deposition, and these conditions persisted during the Chazy, followed by an uplift and then by the great depression which let in the waters of the Black River and Trenton seas over the whole region. It is true that in the Champlain region there is no natural lithologic boundary between the Beekmantown and Cassin, while the basal sandstone of the Chazy does indicate a physical change. But this is a slight one and not to be compared to the greater ones outlined above.

*Day Point, Crown Point and Valcour substages.* The three divisions of the Chazy are sharply marked off from one another lithologically and seem to the writer equally so paleontologically. Moreover, their thickness and importance over most of the Champlain region seem to warrant their separation in mapping, a matter easy of accomplishment on the scale of the 1 inch maps. They would seem therefore worthy of separate names. Brainard and Seeley's lines of division can not be improved on, as it seems to the writer, and the following names are suggested for them; for division A the Day Point limestone; for B the Crown Point limestone; and for C the Valcour limestone. These are not intended to replace the group name but simply as indicative of the three well marked substages of the group. Division A is well shown along the lake shore in the northern part of Peru township, is exceedingly fossiliferous there, and in the near vicinity both contacts are to be found, the upper at Bluff point, the lower on

Valcour. The lower part of division B is magnificently shown on Bluff point, in the southern part of Plattsburg township, and the full thickness, except for occasional small gaps, is well exposed in the Chazy wedge between the Beekmantown and Plattsburg faults in the northern portion of the town.[1] Both contacts show here, and large quarries are opened in the rock. The upper division is splendidly shown on Valcour island, with exhibition of both contacts. It is perhaps equally well shown in Chazy township, and the middle division is also well displayed there with full thickness; but, since the name is used for the full formation, it can not be applied to a substage.

**Lowville (Birdseye) limestone.** In the Mohawk valley the Beekmantown rocks are in many places capped by the thin limestone formation to which the above name has been given. The rock is mostly a gray to drab, brittle, quite pure limestone, usually in rather large massive layers from 1 to 4 feet thick. though much of it is thinner bedded also. It is everywhere penetrated with the vertical, branching tubes of the fucoids which are so characteristic of the formation, which are usually filled with crystalline calcite, and whose cross sections on many surfaces give rise to the bird's-eye appearance which gave the original name to the formation.

Its distribution is erratic and is a matter of considerable importance. It is limited to the south and west sides of the Adirondacks, in the former situation resting on the Beekmantown, and in the latter apparently on the Precambric, though no actual contact is exposed in the whole region, so far as the writer is aware. The drift is very heavy in that region, and little or no work has been done on the rocks since the reports of Emmons and Vanuxem were published. Apparently the formation extends through Herkimer, Oneida, Lewis and Jefferson counties and in considerable strength, but with its base nowhere showing. Toward the north, in Jefferson, the Beekmantown and Potsdam formations begin to appear thinly underneath. Emmons reports a thickness of 30 feet near Watertown, which is probably simply an estimate. This whole western contact line is in need of careful study.

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[1] 15th An. Rep't State Geol., p.556.

Returning to the south side, Prosser's sections through the Mohawk valley,[1] together with the supplementary ones of the writer about Little Falls, are sufficient to show well the bulk and distribution of the formation there. Along East and West Canada creeks the thickness is between 20 feet and 25 feet, beneath which, in most places, there is a gradation into the Beekmantown below through a series of passage beds of intermediate composition and appearance, which have about the same thickness as the Lowville itself. In the district between the two creeks the formation has the same general character though locally the passage beds are lacking and the formation thins. At Canajoharie, 17 miles down the river from Little Falls, the Lowville is absent, the unconformity at that horizon being more plainly marked here than at any other locality. Three miles beyond, about Spraker, the conditions are the same. At Tribes Hill, halfway between Fonda and Amsterdam, and 13 miles below Spraker, the Lowville has reappeared, though no complete section of it has been published, and the passage beds at the base are lacking. About Amsterdam and Hoffman the formation is usually present but very thin, not exceeding 8 feet, seldom reaching 5, and often falling to 2 feet, showing much variation over short intervals and sharply separated from the Beekmantown. East and northeast from this point it is usually absent though occasionally seen, and the last reported occurrence seems to be that near Saratoga, where the thickness is but 2 feet. In this neighborhood the Beekmantown is also very thin, apparently marking the place where the rising of the land during Beekmantown times was first felt, and where the separation of the Champlain and Mohawk Beekmantown basins was first effected.

The prominent features brought out by these sections are: the resting of the Lowville on the Precambric along the western side of the region, the conspicuous unconformity at Canajoharie, the passage beds to the Beekmantown in the West Canada creek region and the great irregularity of the formation eastward from there, with its final disappearance about Saratoga. It is as plainly confined to the south and west sides of the region as the Chazy and Cassin are to the east side; and was thus deposited in a wholly different basin. On the west its waters encroached farther on the Precambric land than the Beekmantown waters did. On the south it was very irregularly deposited, owing to slight unevenness of the floor. It is not certain whether it was contemporaneous with the later Chazy or followed that in time. Its fluctuations in thickness, its occasional absence, and its sharp contact line with the Beekmantown through most of the Mohawk valley give physical evidence of a considerable time gap between the two formations, during which some slight flexing and erosion of the Beekmantown rocks took place, and during which the Cassin and Chazy rocks were being deposited in the Chazy basin. This evidence is so clear that it would seem that the apparent passage beds in the West Canada creek district can not be actually such, but belong with the Lowville. The Lowville depression seems to have invaded the district from the southwest, and these beds represent an older stage of the formation than do any of those found to the eastward in the Mohawk valley.

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[1] 15th An. Rep't State Geol. p.619–59, and N. Y. State Mus. Bul. 34.

**Black River limestone.** This formation is found on all sides of the Adirondacks, though locally lacking in the Mohawk valley. Throughout the Champlain valley region it shows a massive. basal layer of pure, dove-colored limestone which much resembles the Lowville except that it lacks the characteristic calcite tubes. Above this layer the entire formation consists of massive layers of solid, brittle, pure, black limestone, breaking with conchoidal fracture. About the lower end of Lake Champlain it ranges from 30 feet to 50 feet in thickness. Southward along the lake the writer has not seen the sections, but White reports a measured thickness of 71 feet, 3 inches on Crown Point peninsula, the greatest observed thickness reached in the State.[1] From this point it thins toward the south, as do all the Paleozoic formations of the region. In Saratoga county it has an intermediate character, containing layers which resemble the Lowville, Prosser's sections at Glens Falls showing a thickness of 27 feet for the two combined. This seems however an exceptional thickness, most sections in the vicinity being vastly thinner. Coming around into the Mohawk valley, the formation ranges from 5 to 9 feet in thickness about Amsterdam and Hoffman, as Prosser has shown, and is in part massive, in part thin bedded and lumpy. At Tribes Hill there is a 3 foot lumpy layer between the Lowville and Trenton which he refers doubtfully to the Black River. At Canajoharie and Spraker the Black River is absent, as is the Lowville, flat Trenton beds lying directly on slightly folded Beekmantown. In the district about Little Falls it is sometimes present, but more frequently absent, varying rapidly within short distances. Thus at Ingham Mills Prosser gives two sections, which the writer has also seen, in one of which there are 5 feet of black, lumpy limestone, capped by an 18 inch stratum which is lithologically like the Lowville beneath. Near at hand, in the second section, the succession is the same, but the Black River is only 2 feet thick, though it is followed by the same recurrent Lowville layer, above which the Trenton appears. At the old kiln, ¼ mile to the north, is a still better section, showing 8 feet of fossiliferous Black River limestone, underlain by a thickness of 10 feet of Lowville beds, and capped by the Trenton [pl.4]. As in all cases hereabout, the rock is quite thin bedded and lumpy with shale partings. Northward from Little Falls the formation is seldom present and then is very thin; the same is true in the many sections about Middleville. About Newport it has reappeared, with a thickness of 5 feet to 6 feet, thin bedded and lumpy as at Ingham Mills. Followed northwest from here it thickens, and becomes persistent and massive. T. G. White reports a thickness of 20 feet at Boonville and Lyons Falls, respectively 25 miles and 35 miles northwest of Newport, in the Black river valley.[1] It is here for the most part quite massive, though somewhat shaly in its upper portion.

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[1] White, T. G. Geol. Soc. Am. Bul. 10:457.

Farther to the northward, there is little or no accurate published information concerning the formation. Emmons gives the thickness at Watertown as from 7 feet to 8 feet, and the rock somewhat lumpy, though without shaly partings.[2] All along this side of the region the glacial deposits are exceedingly heavy, making rock outcrops very exceptional and meager. There seems however, no reason to doubt that the Black River

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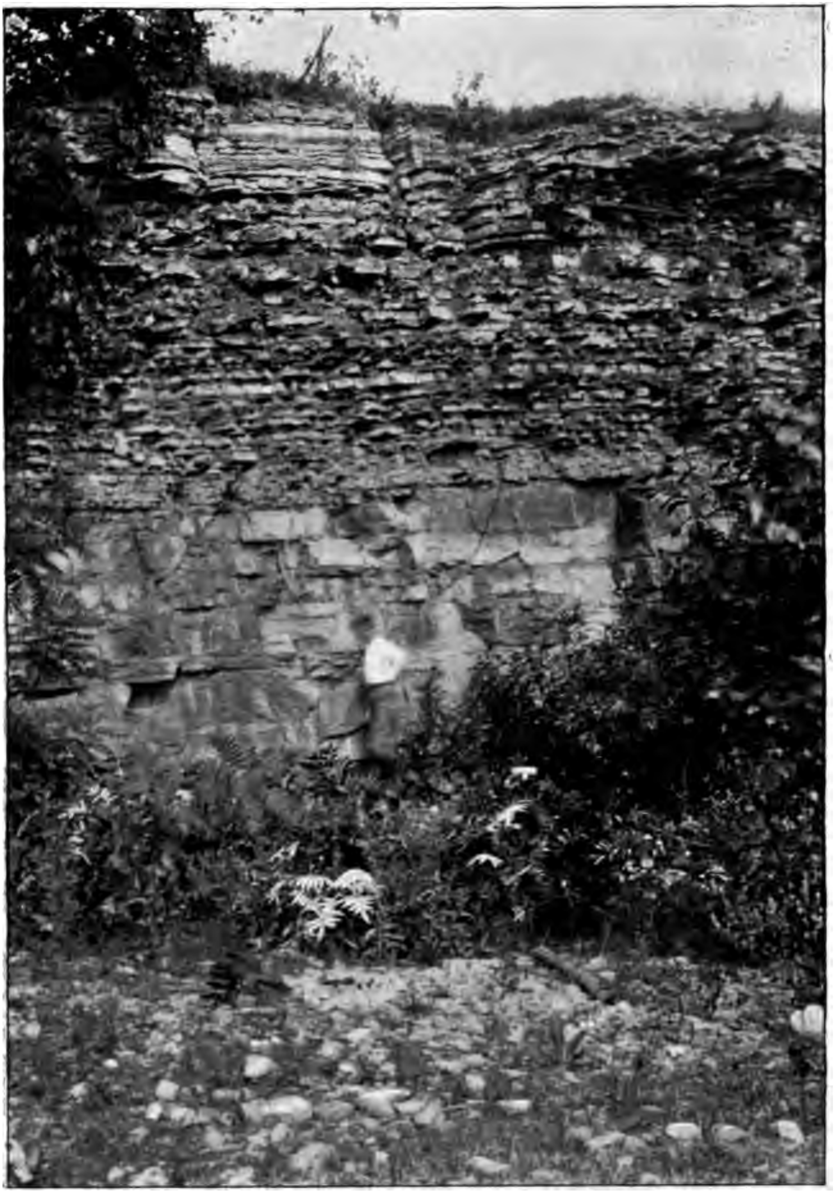
[1] N. Y. State Mus. 51st Rep't, 1: r27-29.

[2] Geol. N. Y. 2d Dist. p.386.

Plate 4



Quarry face at bridge north of Ingham's Mills, showing 10 feet of Lowville (Birdseye) limestone at base, followed by 8 feet of thin black limestone bands with shale partings, of Black river age, and capped by 5 feet of Trenton limestone

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extends along it unbroken, with the Lowville beneath. Hence the Black River sea surrounded the region on all three sides with apparently unbroken connections, much diminishing the size of the former land areas of the region, even that of Beekmantown times, which was the smallest of those that preceded it. The present outcrops of the Mohawk valley are near the old shore line, and the irregular, ridgy character of the bottom was the cause of the variations in thickness of the formation there. Had erosion cut somewhat deeper, in other words, were the exposures of the formation on a line somewhat south of the present, it would undoubtedly extend east and west unbroken. The Beekmantown pebbles in the Black River, in the Tribes Hill-Amsterdam region, reported by Vanuxem and by Prosser, are very significant as showing the near vicinity of the shore line.[1]

**Trenton formation.** The Trenton formation may be said to show a general uniformity in lithologic character all about the Adirondack region, though with much variation in detail from place to place. Instead of the quite pure, massive limestones of the Chazy and Lowville formations, the major portion of the Trenton is found to consist of thin bedded, black, shaly limestones, often with partings of black, calcareous shales, the entire formation being thus contaminated with a certain amount of land wash in the shape of fine mud. The limestones are usually hard and brittle, with conchoidal fracture, though becoming thin bedded and shaly, and even the heavier beds split thinly on weathering.

In all sections there is considerable gray, rather coarsely crystalline, fairly pure, very fossiliferous limestone, usually thin bedded though sometimes becoming fairly massive. While sometimes fairly persistent for considerable distances, such beds are usually lens-shaped masses of restricted lateral extent, entirely surrounded by the black calcareous muds of the ordinary character. Beds of this sort seem less local and more persistent in the Mohawk than in the Champlain valley, as has been pointed out by White, and constitute a larger portion of the formation in the former situation, indicating less local variation in the conditions there.[1] In the Champlain valley they are more limited to the basal portion of the formation than is the case along the Mohawk.

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[1] Geol. N. Y. 3d Dist. p.44; 15th An. Rep't State Geol. 1: 658.

In the lower Champlain region the writer knows of no continuous section of the Trenton, and its thickness there is largely a matter of conjecture. A minimum limit may be assigned, but no maximum, and there are beds, apparently Trenton, whose stratigraphic horizon is yet unknown. In the bed of the Little Chazy river, at Chazy village, the lower 150 feet of the formation are shown, directly overlying the Black River beds, and consisting at the base of slaty layers, alternating with beds of hard, brittle, blue black limestone; the major portion of the section being however constituted of the limestone, the slaty layers vanishing, and in this portion are occasional layers of the gray, crystalline limestone which are masses of fossils.

Along the lake shore northward from Bluff point, Trenton rocks outcrop continuously for ¼ mile, being separated from the Chazy limestones which constitute the point by a fault. Because the outcrop surface is horizontal, and the dip varies much in amount and direction, it is a difficult section to measure accurately, but a thickness of at least 100 feet is involved. At the base are many of the coarse gray, fossiliferous layers, but these die out toward the summit, and the rock becomes shaly. This section seems to overlap, in part, the section at Chazy, but to show higher beds than any seen there.

On Crab island, a mile northeast from Bluff point, out in the lake, an excellent Trenton section is exposed which is practically a continuous one. The exposures comprise part of a low, northerly pitching anticline, the island is nearly a half mile long, and the writer has estimated the thickness of the section at 200 feet. Brainard and Seeley state the thickness to be over 200 feet, and the writer is confident that White's figure of less than 100 feet falls far short of the truth.[2] The lower part of the section, at the south end of the island, shows much of the gray, crystalline, fossiliferous limestone. Following this are thin bedded, slaty layers, but the upper part of the section, comprising more than

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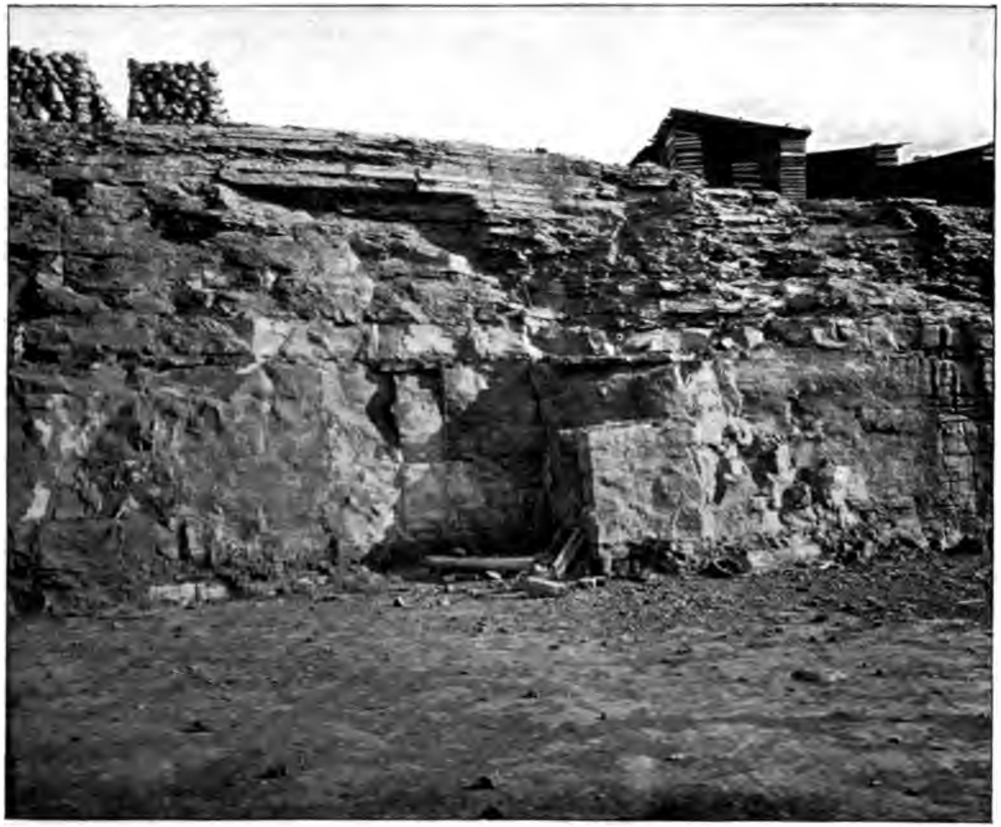
[1] Geol. Soc. Am. Bul. 10:455.

[2] Cushing, H. P. 15th An. Rep't State Geol. p.514; Brainard & Seeley. Am. Mus. Nat. Hist. Bul. 8:308; White, T. G. Geol. Soc. Am. Bul. 10:457.

Plate 5



Black marble and overlying thin bedded limestone in a quarry on the north side of the

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half of its thickness, is formed of blue black, brittle, somewhat muddy limestones, carrying a trilobite, cephalopod, lamellibranch fauna, as distinguished from the abundant brachiopod fauna of the gray limestone. These rocks are nearly on the strike of the section north of Bluff point, and there is unquestionably some overlap in the two; but, as the larger part of the Crab island section is of higher beds than any shown in the other, these three sections can only be fitted together by the most painstaking paleontologic work, perhaps not even by that. The writer is confident that the upper beds on Crab island are from 300 feet to 350 feet above the base of the formation. These are the three best sections of the Trenton which the writer has seen toward the lower end of the lake. They indicate a large thickness for the formation, but give no clue to the amount that may be lacking above the upper beds of the Crab island section.

In a recent report on the geology of Grand isle, Vermont, Professor Perkins has described an interesting section which shows that there is no sharp, lithologic break between the limestones of the Trenton and the overlying black shales of Utica age, but rather an imperceptible gradation from the one into the other, forming a series of passage beds.[1] These consist of rapidly alternating shales and limestones, with a comparatively steady increase upward in amount of shaly matter. The thickness of these beds is not stated, possibly because the section is not sufficiently complete, possibly because their recognition as a separate lithologic unit simply increases the difficulty of constituting boundaries by making two vague horizons instead of one. The beds of distinctively intermediate character seem however to be of considerable thickness.

Along the shores of Cumberland head, on the New York side of the lake, is an excellent, though much disturbed, section, consisting of blue black slaty limestones and calcareous shales, with some firmer limestone bands. These rocks are much faulted and squeezed, and somewhat folded, with much development of slaty cleavage at a high angle with the bedding planes. These rocks extend along shore northward to beyond Point au Roche, in Beekmantown. Dr White states that similar rocks occur on

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[1] Rep't Vt. State Geol. 1901-2, p.167-68.

Grand isle, directly opposite Cumberland head, and it would seem that these are the rocks referred to as transition beds by Professor Perkins.[1] From the study of the fauna White seems to be somewhat uncertain as to the precise horizon, and speaks of it as "very high Trenton or Utica".[2] Since the passage beds on Grand isle are demonstrably such, a comparison of their faunas with those of the Cumberland head rocks should settle the question of stratigraphic equivalency. But, if these be actually the passage beds, their thickness is apparently large, though the Cumberland head section is so greatly disturbed that little exact idea as to its thickness can be obtained. The lithologic character would seem to agree with such a reference.

Published data of precise character in regard to the thickness and nature of the Trenton toward the upper end of the lake, are not numerous. On the Vermont shore, across the lake from Port Henry, Brainard and Seeley give a measured thickness of 314 feet for the Trenton, the exposures being a continuation of the section on Crown point, on the New York side.[3] It is in this section that the Black River limestone attains its maximum thickness of 71 feet. White says of it that, on Crown point, above the Black River, is a continuous series of 100 feet of alternating, compact, sandy and shaly layers, all quite thin, containing the lower and middle Trenton fauna of the region.[4] It is not clear from their account, whether Brainard and Seeley include the Black River in their statement of the thickness of the Trenton or not. White states that there is a hiatus between the upper Trenton bed exposed and the Utica outcrops beyond, but makes no statement in respect to its amount. Nothing is therefore apparent as to the transition beds in the region. But, unless a fault intervenes, it would seem that they can not be of very considerable thickness.

At Larrabee point, opposite Fort Ticonderoga, White gives the Trenton a thickness of 110 feet, the section terminating in that formation, though Utica shale appears in place not far away.[5] The lithologic character of the formation is not touched on, and we

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[1] *Op. cit.* p.114.

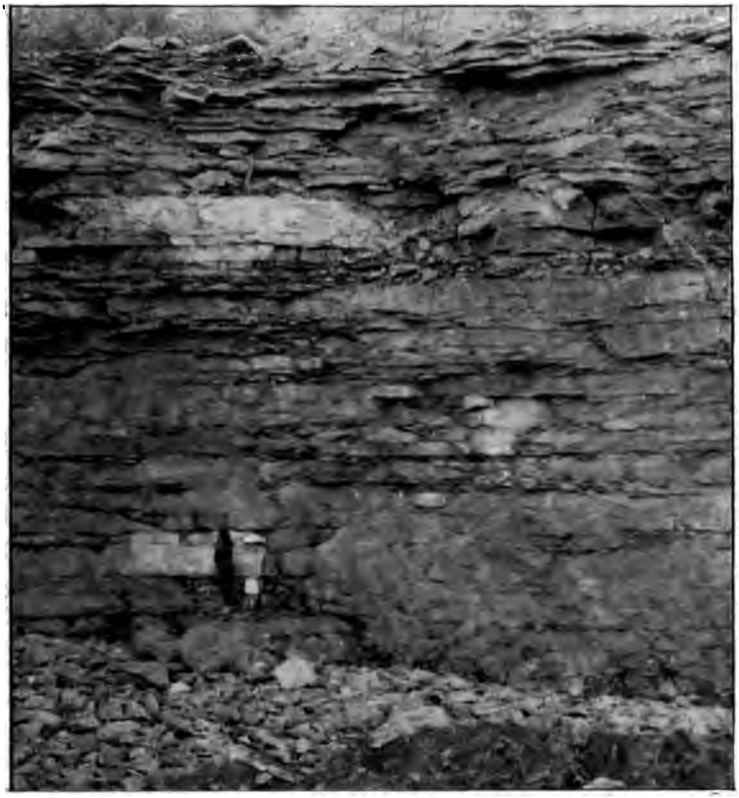
[2] *Op. cit.* p.460.

[3] Am. Mus. Nat. Hist. Bul. 8:313.

[4] Geol. Soc. Am. Bul. 10:457.

[5] *Op. cit.* p.456.

# Plate 6



Trenton limestone in a quarry at Howland's Mill, Saratoga co.

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are left in doubt as to how large a portion is shown, and whether or not a fault intervenes between the Trenton and Utica, as is very likely. Faults so abound in the Champlain region that the finding and measurement of complete sections is a matter of great difficulty, so abound in fact that the geologist is more often called on to demonstrate their absence than their presence. If there is none here, the Trenton has obviously thinned greatly southward.

In the country between Lake Champlain and the mouth of the Mohawk, exposures of the formation are interrupted and fragmentary. At Glens Falls Prosser has measured several Trenton sections, but all terminate in that formation, so that the full thickness is not shown.[1] The greatest measured thickness in the vicinity is 63 feet, the basal portion consisting of very massive, black, fine grained beds, while above is much thinner bedded material, with some intercalation of gray, crystalline layers. If the total thickness were much greater than that shown in this section, it would seem that thicker sections would surely be forthcoming, and their nonappearance seems therefore significant. No passage beds seem to have been noted, but whether their absence is due to nonexposure of the proper horizon or not, is not clear.

Similarly, about Saratoga, Prosser's sections show a maximum measured thickness of 37½ feet for the Trenton, mostly thin bedded, but some massive, and here again the summit is not exposed, so that the entire thickness may be in excess of that amount, but is not likely to be greatly in excess [pl.6].

While the sections at these two localities are not decisive as to thickness, it seems probable that the entire amount can not greatly exceed the figures given, and hence that the formation has rapidly thinned in this direction.

In the lower Mohawk valley, in the Amsterdam-Hoffman region, Prosser and Cuming's sections afford accurate data concerning the formation.[2] They show considerable variation in thickness, the maximum amount being 36½ feet in the section at Morphy's, while the minimum is 20 feet. The lower 6 to 8 feet are of massive, often crystalline, limestone, while the remainder consists of thinner bedded and dark colored, more shaly material.

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[1] N. Y. State Mus. Bul. 34, p.480–82, pl.8.

[2] 15th An. Rep't State Geol. p.647–59; N. Y. State Mus. Bul. 34, p. 419–64.

Coming westward, at Tribes Hill, a measured 40 feet of Trenton is the section record, and it terminates in the formation, so that the actual thickness may be somewhat greater. At the base is a 12 foot thickness of massive, dark blue limestone, with some crystalline lenses, followed by 11 feet of thin bedded, uneven, gray crystalline and dark colored limestones, which are capped by 17 feet of thin bedded, uneven, dark blue limestone.

At Spraker the formation has thinned to 17 feet, both contacts showing, and consists of thin layers of dark blue limestone, apparently representing the upper part only of the Tribes Hill section and with the Lowville and Black River both lacking as well. Three miles west, at Canajoharie, the thickness and lithologic character are the same, and here the unconformity between the Beekmantown and Trenton is also plainly marked by a discordance in dip [pl.7].

In the district about Little Falls the formation shows considerable variation in thickness, with rapid increase westward. On East Canada creek it is about 50 feet thick, with the Lowville always, and the Black River sometimes appearing beneath. Here it consists largely of gray, crystalline, fossiliferous layers, these being capped by thin bedded, blocky, black limestones, which become intercalated with shales and grade into the Utica above, the distinctive passage beds being of about the same thickness as the ordinary Trenton.

At Little Falls Prosser has assigned 104 feet to the formation, though but little of it is exposed in his section. The writer's measurements north of that point show an average of 80 feet of thickness, with again an equal amount of passage beds above.

Along West Canada creek, between Herkimer and Middleville, the Trenton ranges from 100 feet to 120 feet in thickness, the gray, crystalline, thin bedded type largely predominating in the lower half of the section and the dark colored type in the upper. Here also is an approximately equal thickness of passage beds, alternate shale and limestone layers, the limestone being identical in character with the dark colored Trenton type, and the shale being indistinguishable from the ordinary Utica.

Northward from Middleville there are many exposures of the Trenton, but most are of merely the lower portion, and there is

Plate 7

North bank of creek behind Canajoharie N. Y., exhibiting the relati
the Trenton limestone

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no good continuous section. Northwestward also, about Newport and Poland, the sections stop in the lower Trenton, while away from the creek valley the drift cover is excessive. There is however a very good section in Rathbone brook, near Poland. White measured the section here and states its thickness to be 138 feet, with the Black River in place below.[1] He was unable to determine how great a thickness at the base should be regarded as being below anything shown at Trenton falls, where the base of the formation is not shown. The section also terminates in the Trenton and hence gives only a minimum value to the thickness. The incompleteness of the section hereabout is exceedingly unfortunate, since in the gorge of West Canada creek at Trenton falls, the type locality of the formation and distant only 14 miles from Middleville, the section shows a thickness of 275 feet (Prosser), or 284 feet (White), with neither base nor summit exposed.[2] Reference may be made to their papers for the details of the section, which consists mainly of thin bedded, dark blue limestones, with considerable admixture of the gray, crystalline beds, and with occasional massive layers; the whole capped by the 26 feet of massive, gray layers at Prospect [pl. 8 and 9]. Underneath this cap considerable shale is intercalated with the thin limestones through a thickness of 60 feet, giving a lithologic combination quite like that of the passage beds elsewhere. Nothing can be learned concerning these in the vicinity, unfortunately. According to White the lower portion of the Rathbone brook section underlies the base of the section at Trenton falls, but he does not hazard a suggestion as to the actual thickness involved. It seems however quite safe to say that the Trenton at Trenton falls is approximately 300 feet thick, more than double its thickness at Middleville, 14 miles away to the south of east. Only 27 miles farther to the southeast lies Canajoharie, with its 17 foot thickness for the limestone, the minimum for the State. Some of the latter diminution is due to overlapping unconformity, the base disappearing, but in either case it is obvious that the increase west from Middleville is more rapid than is the decrease eastward. Also that the increase in thickness is upward, implying that the muds of the passage beds and Utica advanced on the region from the east, and Trenton conditions persisted longer westward. In other words, that, while the upper Trenton was accumulating in comparatively clear waters, in the Trenton falls region, incursions of mud were producing the lithologic combination of the passage beds about Middleville and eastward, while yet farther east shales were being laid down. This is by no means a new suggestion, though the stratigraphic evidence for it has not been so marshaled hitherto. Even if it be granted, it does not fully explain the sudden increase in thickness at Trenton falls, when compared with the much more trivial variations which characterize the whole length of the Mohawk valley below Canajoharie.

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[1] N. Y. Acad. Sci. Trans. 15:84.

[2] 15th An. Rep't State Geol. p.626 and footnote.

Concerning the formation along the west side of the Adirondacks, our knowledge is very fragmentary. As has been stated, the heavy drift cover on this side of the region is an effective bar to satisfactory areal work. Well to the north, about Watertown, conditions are much better, and the Trenton is magnificently shown. Emmons's descriptions show that it has the same lithologic characters here as at Trenton falls and elsewhere, consisting partly of dark, fine grained, and partly of gray, crystalline limestone, the former often interleaved with shales; also that often the summit is gray and massive, as at Trenton falls, which is not the case in the Mohawk and Champlain valleys. He states the thickness at Watertown to be about 300 feet, which, judging from his estimates of thickness of the rocks in other parts of the second district, is likely to be an underestimate.[1]

Quite fortunately the gas wells drilled within the past 20 years to the west and southwest of the region help to bridge the gap in the sections and furnish important data in regard to the thickness of the formation. The wells at Pulaski and Sandy Creek in Oswego county, which are 55 miles northwest of Trenton falls, and respectively 25 and 32 miles to the west of south of Watertown, have been described, and the sections interpreted by Professor Orton.[2] As is often the case, it is difficult to determine precise formation boundaries from the records, owing to a variety of causes. At Sandy Creek the thickness of the Trenton is uncertain but seems surely as much as 600 feet. At Pulaski the wells

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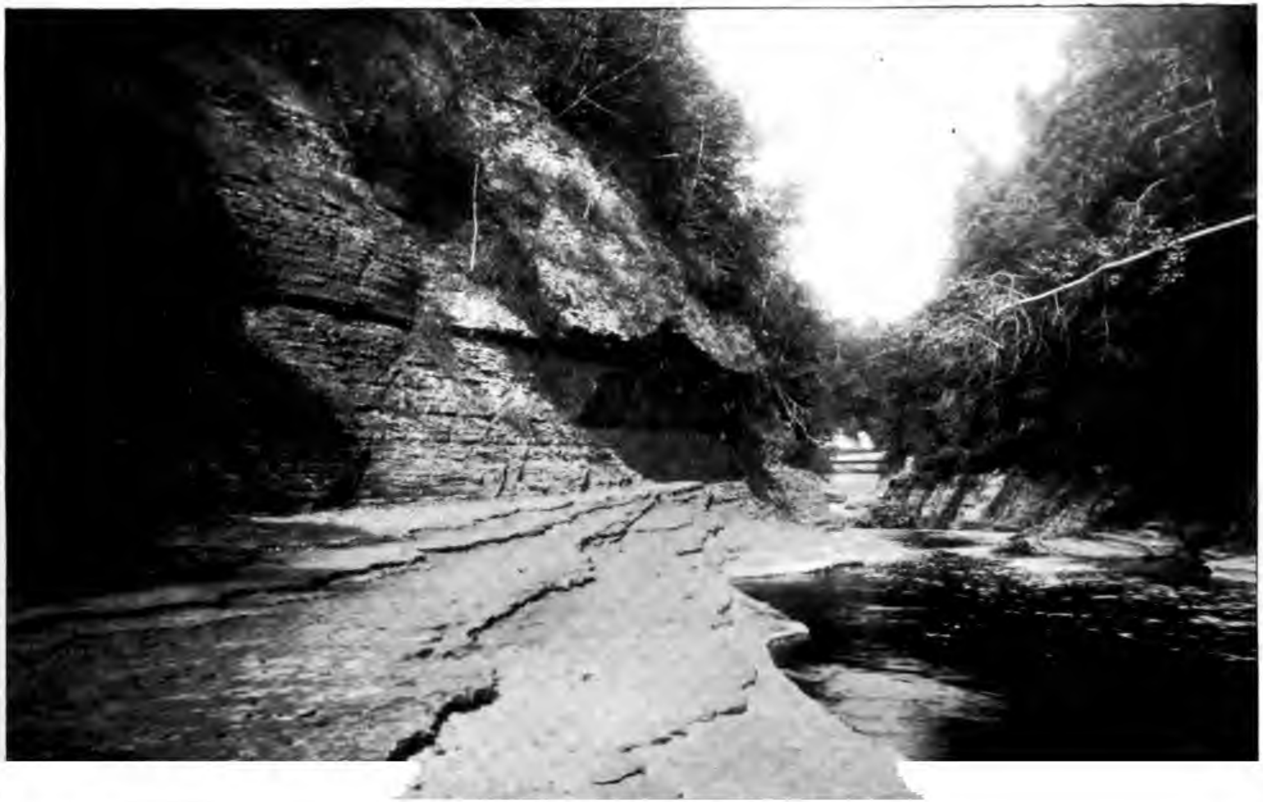
[1] Geol. N. Y. 2d Dist. p.387–88.

[2] N. Y. State Mus. Bul. 30, p.434–48.

Plate 8



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were drilled deeper, and from their records Orton constructed a generalized section for the vicinity, which allots a thickness of 600 feet to the formation (inclusive of the Black river and Lowville), and 200 feet to the Beekmantown beneath.[1] At Stillwater, 10 miles southeast of Pulaski, he indicates a thickness of 670 feet for the Trenton, and no allowance is made for the Beekmantown, which is surprising and suggests the query whether the Trenton has not been thickened at its expense. Here also the upper 300 feet are significantly referred to as "White Trenton" and the lower portion as "Dark Trenton," an arrangement of interest when compared with the type section.

A few wells are also reported on in Jefferson county, but the records given are very fragmentary.[2] In Adams township, next southeast of Watertown, three wells were drilled to the Precambric, which was reached at from 915 to 960 feet. Except for a few feet of drift the wells began in the Trenton and very near its summit. It seems incredible that the formation should be 900 feet thick here, but this includes the Black River and Lowville, and, in all probability, at least a small thickness of the Beekmantown, though it is not certain that that formation is here present. It is found however in outcrop not many miles away to the northeast, though it is not thick. However this may be, and making the most generous allowance possible, there yet remains a huge thickness which must be ascribed to the Trenton proper.

Notwithstanding their imperfections, these sections indicate with clearness that the thickness of the formation at Trenton falls is not a mere local matter, but that it is held, and much increased to the north, on the west side of the Adirondack region. As the same records show, the overlying Utica rapidly thins in the same direction.

In the Mohawk valley, west from Herkimer, the drill has also given corroborative evidence.[3] In the well at Ilion, only 3 miles west of Herkimer, the section shows 105 feet of Trenton, about what should be expected from its measured thickness along West Canada creek between Herkimer and Middleville. At Utica, 12 miles farther to the north of west, the Trenton is certainly 330 feet thick, and perhaps more, the line between the Trenton and Beekmantown being difficult to draw with precision in that well. At Vernon, 17 miles west of Utica, 350 feet of the well section are assigned to the Trenton, and at Rome, 11 miles northwest of Utica, 375 feet. These thicknesses are not so great as those farther to the north, but the sudden increase in thickness between Ilion and Utica is quite analogous to that between Middleville and Trenton falls, along the more northerly line. At Chittenango, 35 miles west of Utica, the drill passed through 636 feet of apparent Trenton, and rested in that rock, a thickness directly comparable with that shown in Oswego and Jefferson counties.

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[1] *Op. cit.* p.442.

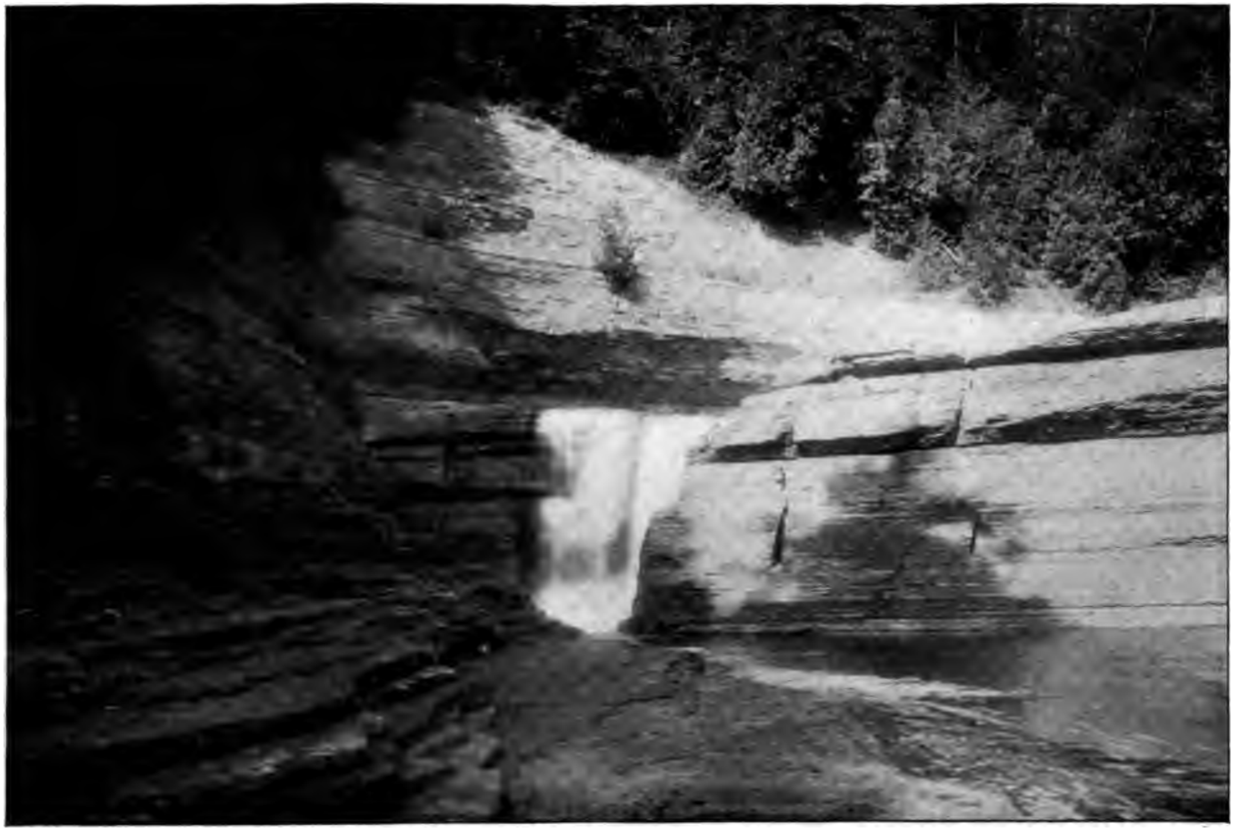
[2] *Op. cit.* p.456–59.

[3] Prosser, C. S. Am. Geol. 25:131–49; Geol. Soc. Am. Bul. 4:100.

**Utica formation.** This formation is, as a whole, surprisingly homogeneous all about the Adirondacks, consisting of fissile, black, somewhat calcareous, clay shales, which, like most carbonaceous shales, tend to split thinly and evenly and to have a somewhat slaty character. They become usually more fissile and less calcareous above, while below thin bands of shaly, black limestone commence to appear and increase in abundance, forming more or less of a transition to the Trenton beneath. Definite passage beds of the sort, of considerable thickness, are often found, but the evidence is not decisive as to whether they are, or are not, everywhere present in force. More likely they are not, and this seems specially probable on the west side of the region, and also in the lower Mohawk valley; whereas in the Champlain valley and the upper Mohawk region they have much importance. These beds are also a mixture faunally, the rather restricted fauna which characterizes the pure Utica occurring with a considerable number of Trenton forms, so that the line of demarcation between the two formations will vary greatly, according as it is drawn at the first appearance of the Utica fauna, on the one hand, or at the final disappearance of the Trenton fauna on the other. The case is one where it seems certain that the two contrasted faunas were living in the same basin at the same time, each in situations where the conditions were favorable, and each under different sorts of conditions; and that the one set of conditions increased in area occupied, and its fauna spread, at the expense of the other.

In the Champlain valley it is difficult to arrive at any precise notion regarding the thickness of the formation. It is the

**Plate 9**



Trenton falls. Sherman fall from above the "Narrows"

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TILDEN FOUNDATIONS.

youngest of the Paleozoic formations there exposed, it is likely that no considerable thickness of any younger deposit was ever laid down on it, and hence it has been largely removed by erosion, more so than any of the others, so that its summit nowhere appears. The question is made more complicated by the faulted character of the region and by the fact that the disturbances here have folded and cleaved the Utica more than they have any of the subjacent rocks. White reports the formation as having a thickness of several hundred feet throughout the valley, but, in making this statement, includes the Cumberland head rocks, whose fauna he elsewhere states to be a transition one.[1] If they are to be included, the writer's estimate, based on work in the same region, would coincide. A few miles east of the lake shore in Vermont, Brainard and Seeley at Shoreham, and Walcott at Highgate Springs, have inferentially indicated a large thickness for these shales by calling their upper portion Hudson River, instead of Utica. The deposits at the latter locality would seem however to belong to the Levis, rather than to the Chazy basin. In the discussion of White's paper, Ami urged that the Utica about Ottawa is but 75 feet in thickness; and it may well be that its thickness in the Champlain valley has been overestimated. Adequate notions concerning the actual amount are not to be had as yet. So far as New York is concerned, the fauna of the Cumberland head shales seems to be confined to the lower Champlain region.

In the Mohawk valley we meet for the first time with overlying formations, so that the Utica summit is exposed, and definite evidence in regard to its thickness can be obtained. Cumings has shown, in eastern Montgomery county, a thickness of the Utica of from 1000 to 1200 feet.[2] Thence westward to Little Falls no measured sections have been carried through the formation, so far as the writer is aware. South of the Mohawk, near Little Falls, the writer has measured over 600 feet of the formation, without reaching its summit. Walcott gives 710 feet as the thickness shown in the Campbell well, near Utica.[3] These go to show that the thickness in the Mohawk valley is great, and also that it diminishes somewhat westwardly, so that it has but little over half the thickness about Utica that it has in eastern Montgomery county.

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[1] Geol. Soc. Am. Bul. 10:456-57.

[2] N. Y. State Mus. Bul. 34, p.466.

[3] Geol. Soc. Am. Bul. 1:347.

North and west from Little Falls, it will be remembered that the Trenton thickens, rapidly and suddenly, and it is of interest to note the coincident thinning of the Utica. Commencing at the north, Walcott's measured section along Sandy creek, in Jefferson county, shows the Utica to be 180 feet thick, with an additional 100 feet of passage beds to the Lorraine shales above.[1] In Oswego county Orton reports, at Central Square 729 feet of shales (Pulaski and Utica) between the Oswego sandstone and the Trenton, of which 150 feet are ascribed to the Utica; at Oswego 597 feet of shales in the same interval; at Stillwater 643 feet, of which 113 are thought to belong to the Utica; about Pulaski 300 feet to 500 feet of shales, of which 100 feet to 250 feet represent the Utica thickness; and at Sandy Creek (Oswego, not Jefferson county), 250 feet to 300 feet of Utica.[2] These are vastly thinner than the Mohawk sections and overlie in general from 450 feet to 650 feet of Trenton, usually in a definite inverse ratio, a strong indication of the contemporaneity of the upper Trenton and lower Utica in the contrasted districts. Moreover, Prosser shows 1020 feet of shales in the Vernon well, of which 300 feet are Utica, overlying 350 feet of Trenton; 873 feet in the Chittenango well, of which 233 feet are Utica, overlying 60 feet of passage beds and some 600 feet of Trenton; 505 feet at Baldwinsville, north of Syracuse, the amount to be attributed to the Utica not being stated; and at Auburn 557 feet of shales, the drill resting in the Trenton 240 feet below its summit.[3] These show definite Trenton thickening, and Utica thinning westward, though the change is more gradual than it is to the north.

**Lorraine formation.** While no paleozoic rocks younger than the Utica shale are found in sufficient proximity to the Adirondack region to justify any detailed discussion of them in a consideration of Adirondack rocks, yet some of them are sufficiently involved with its past history, as will appear beyond, to deserve some notice.

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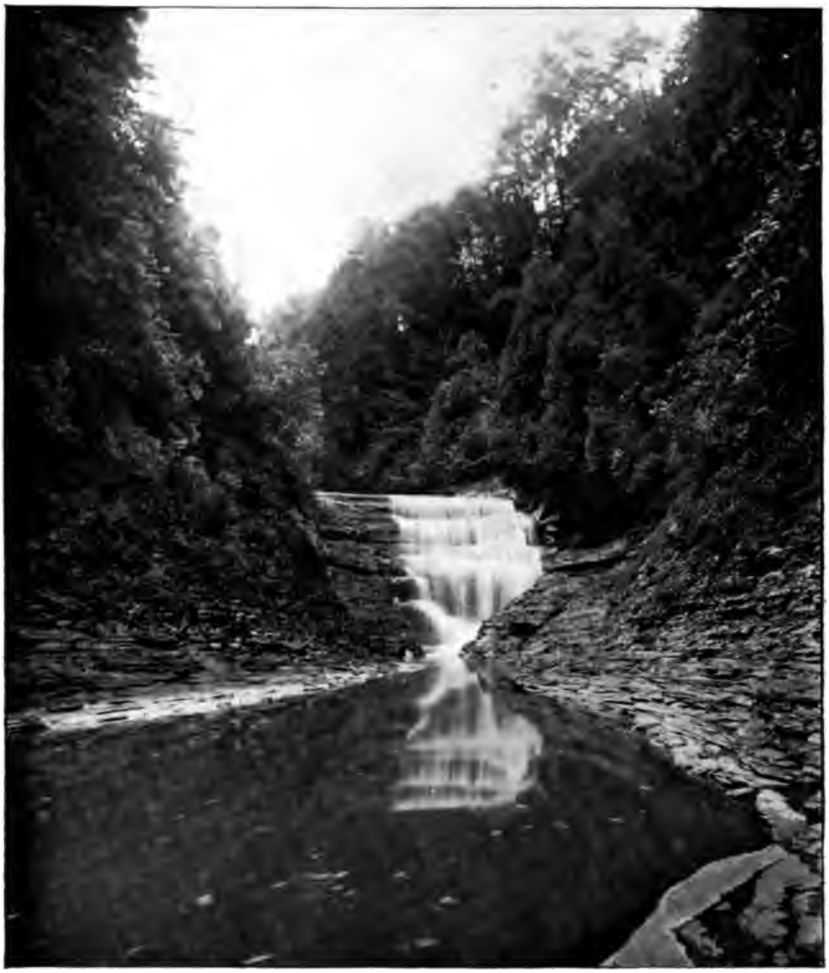
[1] *Op. cit.* p.348.

[2] N. Y. State Mus. Bul. 30, p.456, 449, 442, 437.

[3] Am. Geol. 25:152, 161.

Plate 10



Falls over Utica slate in the ravine behind Canajoharie N. Y.

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On the south and west sides of the region, the Utica shales are overlain conformably by a group of shales and sandstones, often with passage beds between; and the group has usually a large thickness, as the section and well records just quoted demonstrate. There is no direct evidence that equivalent rocks were ever deposited in the Chazy basin of the Champlain valley, but neither is there any weighty evidence that they were not. South of the Mohawk, however, and all along the west side of the region, they appear in force. The above quoted records show that the formation thins westward through the Mohawk valley, is thinnest at Utica, where only its base is present, and thence thickens rapidly to the north and west. Walcott has given a thorough discussion of the evidence, showing that it argues for a shallowing of the sea along the Utica meridian early in Lorraine times, thinning the section there, and preventing thereafter a commingling of the western (Lorraine) fauna, with the forms to the eastward of the barrier, which hence separated the eastern Mohawk basin from that of the interior.[1] It is by no means improbable that this uplift at Utica is but part of a greater movement, which extended thence to the northeast, bringing much, if not most of the Adirondack region above sea level and causing also cessation of deposition in the Chazy basin.

The great thickness of the Lorraine rocks, both in the eastern Mohawk region and in Jefferson and Oswego counties, together with the fact that their present line of outcrop is owing to long continued, surface erosion, and that the effect of this erosion is to cause the line of outcrop continually to recede from the Adirondacks, sufficiently indicates that in the past they must have extended in over them, likely for several miles, and that in some considerable thickness; and that during Lorraine times a considerable area, specially on the northwest and the southeast, remained yet submerged, in spite of the uplift described above. In addition, it is by no means impossible that some of the later Siluric rocks may have overlapped on the southern and western margins of the region, though this is much more open to question than is such a former extension of the Lorraine rocks. Certainly, the general tendency to subsidence over the district, initiated in

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[1] Geol. Soc. Am. Bul. 1:344-50.

Cambric times, was checked and replaced by the contrary tendency during Lorraine times, a tendency which has, in the main, persisted to the present.

**Helderberg submergence.** On the south and west of the Adirondack region the Lorraine rocks are successively overlain by the Medina, Clinton, Niagara, Salina and Waterlime deposits. These are more likely to have overlapped on the west side of the region than elsewhere. On the south they thin and disappear in going eastward, showing that they are approaching a shore line in that direction, and that the lower Mohawk region was not receiving deposit during most of the interval. Then ensued a change at the extreme east, a considerable depression being formed there, in which marine limestones accumulated, whose fauna entered the basin through some connecting channel with the eastern sea. These rocks do not extend westward as far as the upper Mohawk region, showing that that district did not participate in the depression, or else that a barrier was formed there, separating the eastern basin from that to the west, waterlime conditions persisting in the latter after they had been brought to an end in the former. From Albany these rocks extend far south into the Appalachian region, as deposits in a long, trough-shaped basin. As to the northern limits of that basin, we are in ignorance, the deposits having been swept away by erosion; but, since it is known that the present line of the St Lawrence was also depressed during that time, deposits of that age occurring on St Helen's island, near Montreal, it is rendered quite likely that the Champlain and upper Hudson valleys were also involved, forming a channel which furnished a connection with the outer sea by way of Montreal. If such were the case, the subsequent removal of the deposits has obliterated all the evidence on which a demonstration might be based. There was some connecting channel with the outer sea; there may have been more than one; the line suggested would furnish a natural route.

**Summary of early Paleozoic oscillations of level.** The evidence which is given by the distribution, character and thickness of the several Paleozoic formations which were deposited on, and around, the Adirondack region, as to the oscillations of the land surface, has been treated in some detail in the foregoing pages, but a concise summary of it may well find a place here.

The Potsdam is confined mainly to the north and east sides of the region. It comes around into the Mohawk region, but is thin there and fades out to a vanishing point about midway of the valley. It does not appear at all on the west side of the territory. It is thickest on the northeast, in Clinton county, and there alone is any great thickness of its peculiar, basal portion to be found. To the south and west the formation thins by disappearance of this base, and it would seem therefore that deposition must have commenced on the northeast and advanced progressively westward and southward, so that by the close of the Potsdam the northeastern district had undergone large submergence, whereas on the southwest the shore line was yet outside of the present Precambric margin, and the amount of subsidence had been trifling; that is, that there existed a large, unsubmerged area on the south and west at the close of Potsdam time.

The formation was laid down on a comparatively even floor of older rocks, whose evenness was mainly due to previous protracted wear on it while a land surface; but, in spite of the *comparative* evenness, the floor shows much minor irregularity, whose amount seems to increase with increasing thickness of the overlying Potsdam. All the workers on the north and east sides of the region have observed and commented on the irregularity of the floor, which sometimes amounts to some hundreds of feet. In the Mohawk valley region the floor seems to have been exceedingly even and flat, much more so than on the north. Since the former was barely, or not at all submerged by the Potsdam sea, while the latter was early invaded by it, the one did and the other did not experience subaerial erosion during Potsdam time, this furnishing an obvious reason for greater smoothness in the former, though it may not be the whole reason.

The upper division of the Potsdam would seem plainly to be a marine sand deposit. Quite likely this is true of the middle division also, though it is not so certain because of lack of fossils. It seems possible that the basal portion, which is developed only on the northeast, may represent a flood plain deposit under conditions of climatic aridity. The red color and the undecayed character of the feldspar grains in this portion may perhaps be thus explained.[1]

Above the basal division the rock becomes a purely quartzose one, and the red color disappears. This middle portion of the formation, as shown in Clinton county, becomes however its base to the west and south, because of the gradual encroachment of the subsidence in those directions, explaining the lack of arkose in St Lawrence county and in the Mohawk valley. Because of the occurrence, in St Lawrence county, of a quite pure, quartz sandstone resting on an uneven surface of crystalline rocks, Smyth has argued for a humid climate with rapid weathering at the time; and that, owing to the resistant character of the underlying rocks, the waves did not act for a sufficiently long time at a given level to plane away the rock floor to an even surface, though the time was sufficiently long to weather and triturate all minerals save the extra resistants quartz.[2] The writer quite agrees that a change in climate is probably indicated by the change in the rock character.

The offshore mud deposits of Potsdam time are nowhere exposed to view about the region. Some slight deposit of limestone took place, as shown by Walcott for the district about Saratoga, and by the well records published by Orton for the Oswego county region. The formation tends often to become somewhat calcareous or rather dolomitic, above, and everywhere grades into the overlying Beekmantown through a series of passage beds, which show rapid alternations of the two sets of contrasting conditions, the one gradually overcoming the other, so that subsidence must have been progressive, and no great time interval could have elapsed between the two deposits.

The bulk of the Beekmantown formation is composed of sandy dolomites, all very barren of fossils. They seem to the writer to indicate shore conditions and to a considerable extent "salt pan" conditions.[3] With the oncoming of Beekmantown time subsidence commenced on all sides of the Adirondack region; but, as was the case also in the Potsdam, it was most pronounced on the northeast and diminished in amount toward the west and south. The formation must have encroached on the Adirondack island on all sides, greatly diminishing its previous area. On the south side specially a large transgression of the sea on the former land took place, since the Potsdam shore line had been an unknown distance to the south of the present line of the Mohawk valley, while the Beekmantown has a thickness of from 300 feet to 500 feet there, and its shore must have lain several miles to the northward. On the west side of the region but little subsidence took place, and the Beekmantown shore line lay to the west of the present Precambric border there. In the Champlain region the formation has treble the thickness that it has along the Mohawk, and the transgression of the sea on the northeastern portion of the region must have been of vast extent. The Adirondack land mass must certainly have been an island during the Beekmantown, whose area was small compared with the present size of the region, and which lay mainly in its western portion, extending eastward for an unknown distance, greatest on the south side.

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[1] The writer has long been of the opinion that the early Potsdam climate was an arid one; and recent correspondence with Mr van Ingen has disclosed that he is also disposed to hold a similar view and is investigating the matter with the development of new and interesting evidence.

[2] N. Y. State Geol. 19th Rep't 1899, p.r100–2.

[3] Dana, J. D. Man. of Geol. ed. 4, p.133.

Then conditions changed, and the downward movement was replaced by an upward one, which caused cessation of deposition on the south and west sides of the area, brought a large but unknown amount of the previously submerged tract above sea level, so that the Beekmantown island was greatly extended in those directions, and shut off communication between the basin on the southwest and that on the northeast. The latter district did not feel the upward influence, but continued to subside, and the limestones and dolomites of the Cassin formation were deposited on the normal Beekmantown. The abundant fauna found fossil in these beds and absent from the Beekmantown beneath, must have entered the basin from the east or north, arguing for extended depression and open sea connection in one or the other, or both, directions.

The depression on the northeast persisted throughout Chazy time, though likely with interruptions, of which the most important is indicated by the basal sandstone of the Chazy. Like the preceding Cassin subsidence, this diminished rapidly in amount southward, so that the rocks disappear through thinning at the upper end of the Champlain valley, the middle division of the formation being the last to vanish. Following the deposit of the upper beds, uplift ensued, or at least a cessation of subsidence and of deposit; there is little or no indication of wear at the Chazy summit, so that the surface could not have been raised much, if any, above sea level.

The large amount of subsidence on the northeast during Potsdam, Beekmantown and Chazy times must have involved that entire section of the present Adirondack region, since the Precambric floor of the district was not vastly irregular, nor could its seaward inclination have been great. The amount of rock thickness of these three formations which was deposited in the lower Champlain valley was from 3500 feet to 4500 feet, so that the upper Chazy deposits must have been carried far into the present heart of the Adirondacks by their overlap on the old land slope.

During Chazy times the Cassin elevation on the south and west sides of the region persisted, and no deposits of Chazy age were formed. The land was in fact sufficiently elevated to permit a certain amount of erosion of the Beekmantown deposits which formed its surface. The uplift was accomplished without tilting or folding of the rocks, except in a very minor degree, and in general the Lowville rocks appear to overlie the Beekmantown conformably. In some sections, as at Canajoharie, there is a plain discordance in dip between the two formations, owing to a very slight folding of the Beekmantown [pl.7]; but in most places nothing of the sort can be made out, though a comparison of several sections usually suffices to show that the Lowville does not always rest on the same bed of the Beekmantown. The surface was planed down to great evenness, arguing for either a long continued period of wear or else for a very low altitude and gentle surface slope.

The uplift of the northeastern region at the close of the Chazy was coincident with, or somewhat closely followed by, a movement of downward character on the south and west, which much diminished the land area there, bringing the shore line in close to the present Precambric margin of the region. The

Lowville limestone was deposited in these waters. The movement of the region was apparently pivotal, along a northwest and southeast axis which crossed at the upper end of the Champlain valley, sinking on the one side being accompanied by rise on the other. In that district this line formed the southern shore line of the Chazy sea and also the northern shore line of the Lowville sea. The thinness and the intermittent character of the Lowville formation, along the present line of the Mohawk valley, would indicate either that the Lowville shore line was not far away to the north, and that the subsidence was only trifling, or else that, after the deposition of the material, an uplift occurred and considerable wear took place. So far as the slender evidence goes, the former would seem to have been the case, since the unconformity at the base of the Lowville is much more pronounced than that at its summit, in fact there is little sign of wear at the latter horizon; while the not infrequent occurrence of alternating Lowville and Black River conditions would seem to bind the two formations rather closely together. It is therefore thought probable that the Lowville sea extended but little north of the Mohawk line and hence encroached little or not at all on the Adirondack region from the south.

On the west side of the region the formation has much increased thickness and apparently for many miles rests directly on the old, Precambric floor. Its thickness would argue that it must formerly have extended in several miles over the western Adirondack border, and farther than any of the preceding seas had done.

During Lowville time therefore the bulk of the Adirondack region was a land area, with wide extent to the north and east beyond the present boundaries of the district, with its southern shore line rudely corresponding to the present Precambric border on that side, and its western edge alone somewhat submerged.

The Black River limestone follows the Lowville on the south and west, with no sign of a structural break between the two. In the Mohawk valley the formation is thin and sometimes absent. In some cases its nonappearance is definitely due to the fact that the Lowville deposits had not completely filled the slight depressions in the Beekmantown floor on which they were laid down, and the added thickness of the Black River was also insufficient completely to fill them. In these instances it seems clear that the slight elevations on which no deposit took place must have existed as shoals, and that hence the water was very shallow, and the shore line close at hand, as seems to have also been the case during the Lowville. There are sections, as in the Moore quarry at Pattersonville, measured by Prosser, in which the Black River rests directly on the Beekmantown, though the Lowville occurs thinly at its proper horizon, no great distance away, and such a section is demonstrative of uneven surface. On the other hand, the writer's work in the Little Falls region has shown that the Black River there has a very patchy distribution, and that about Middleville it is definitely absent, though the Lowville occurs there in considerable strength, and this is thought to point to an unconformity between the Black River and Trenton, the Black River being absent because of uplift and wear, after its deposition and before the beginning of the Trenton. Not unlikely the strong unconformity at Canajoharie is in part due to wear of this date, and not all to be ascribed to the period of Postbeekmantown erosion. This uplift seems to have been localized here at the southeast, since only there is the Black River found to be lacking. In the Mohawk region then, the shore line was close at hand and was irregular, though not so much so as at the commencement of the Lowville, and the one formation followed the other with no sign of a break, the two deposits combined nearly, but not quite, filling up the depressions; thence ensued an uplift about Little Falls, which brought about removal of the Black River through wear and caused the Trenton there to rest on the Lowville.

With the oncoming of Black River time, rapid subsidence seems to have been initiated on the east side of the region, the Chazy basin becoming again submerged; and the deposits thus laid down must have encroached as widely into the heart of the Adirondacks as the previous Chazy deposits had done. On the west side of the region also the formation is everywhere present, and thicker than on the south, so that the Black River sea was continuous around the region, and must have widely submerged it. There must have remained unsubmerged, however, an island of considerable size, occupying approximately the same position as the previous Beekmantown island, but with considerably diminished area, specially on the western side. As in that case, this land was massed on the south and west.

The only stratigraphic evidence of a break between the Black River and Trenton, seems to be in the upper Mohawk region, where there is certainly a slight unconformity, with locally entire removal of the Black River. In Trenton times also the Mohawk region was but slightly submerged, and the formation is but thinly developed. This would argue some shore line near at hand, and Kemp's study of the Paleozoic outlier at Hope demonstrates the presence of land near the southern Adirondack margin, during at least the early Trenton.[1] In addition, it seems to the writer that this outlier presents suggestive evidence of the truth of the arguments advanced in the preceding pages, regarding the small extent of the invasion of the southern Adirondacks by the successive seas. In this outlier Potsdam, Beekmantown, Trenton and Utica strata are all present, and, with the possible exception of the last, none of them seem to have been deposited in great thickness, though during intervening periods of wear some thickness of each may well have been removed. Apparently the deposits indicate the near vicinity of a shore line to the north in Potsdam, Beekmantown and early Trenton times, and their thinness and character are due to such proximity.

Throughout most of the Mohawk valley region the Trenton has no great thickness, indicating but slight subsidence during its deposition. On the east and west sides of the region, however, it attains large thickness, hence subsidence was in progress on all sides of the district, and the encroachment of the sea over it must have considerably exceeded in extent even that of the previous Black River sea. The Black River island must have been nearly, if not utterly, wiped out by the close of the Trenton.

Then came in the muds of the Utica, appearing first on the east side of the region and gradually encroaching westward. Ruedemann's argument for the extension of the Utica over the entire Adirondack region, based on the parallel alinement of the graptolite fronds found fossil in the shales, as indicative of a uniform, unopposed current, seems to the writer to be conclusive.[1] The argument based on the thickness of sediments about the Adirondacks, and their necessary wide overlapping on the gentle slopes of the Precambric old land, also seems conclusive as to complete submergence during the Utica, the thickness and the evidence of gentle land slope being ample to warrant the conclusion. If any land remained during the Utica, it could have consisted of nothing more than a few, low, insignificant islands, and such must have been along the southern margin of the region. The slight amount of Trenton submergence in the lower Mohawk region may well indicate that, during a portion of Trenton time, there existed here a shoal barrier between the eastern and western basins.

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[1] 18th An. Rep't State Geol. 1898. p.145-52.

The Utica was brought to a close by the shallowing of the waters, which may well have brought a considerable part of the Adirondacks, specially on the north, above sea level, though this is mainly conjectural. During Lorraine time, which followed, a shoal was developed in the region about Utica, probably extending thence northeastward, which separated the eastern and western waters. This would seem definitely to imply the emergence of land to the northward, and likely by the close of the Lorraine a large part, if not the whole of the Adirondacks, was elevated above sea level. The following Medina, Clinton and Salina waters washed the western and southwestern sides of the region only and may well have somewhat encroached on its margins. Then came elevation on the west, and the Helderberg depression on the east, the latter probably involving the eastern border of the district. The succeeding Devonic deposits may have reached the southern rim of the area, but could hardly have invaded it to any considerable extent.

**Paleozoic igneous rocks.** On both the eastern and southern margins of the Adirondack region, the Paleozoic rocks which fringe it are found to be cut by igneous rocks, mainly in the dike form. In the Champlain region these rocks cut, and are therefore younger than, the Utica shale, the youngest of the Paleozoic rocks to be found in the district. In the upper Mohawk district the dikes also cut the Utica shale.

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[1] Am. Geol., June 1897 and February 1898, p.75.

The Champlain eruptives of this period have received detailed description from Kemp.[1] They are more abundant in Vermont than on the New York side of the lake, and on that side seem mostly confined to Essex county, and to the near vicinity of the lake shore. They extend into Clinton county however, in which six small dikes belonging to this group have been found, are still more abundant in northern Vermont and extend thence northward into Canada. The Adirondack region seems to have been on the outer border of the region affected by the igneous activity.

Two contrasted groups of rock are present, the one light colored and acid, the other black and basic. The former are classed as bostonites by Kemp, the latter as camptonites, monchiquites or fourchites, according to their mineralogic character. As in the case of the older, Precambric dikes, the acid rocks seem less numerous than the basic and with a more restricted distribution, though these differences are in much less noticeable degree than in the earlier case.

*Trachytes (bostonites)*. In New York State rocks of this group seem confined to Essex county, at least none have been discovered elsewhere. Kemp describes them as of prevailing light color, creamy or brownish white usually, but sometimes a light chocolate; of rough and granular feel and a fracture like that of trachyte. Phenocrysts are not numerous in general and are nearly always of feldspar, quartz having been noted but rarely. The ground-mass is constituted of minute feldspar laths with usually well marked flow structure. Between the laths small particles of interstitial quartz are sometimes to be detected. The feldspar is both orthoclase and anorthoclase, little or no plagioclase being present. A considerable amount of hematite is present in minute, disseminated scales, but aside from the above no certain primary minerals can be made out. Calcite, quartz, kaolin and limonite are the principal materials resulting from alteration, and in general the rocks seem hardly as fresh as the older syenite porphyries of Clinton county, which they much resemble.

At Cannons point, just north of Split rock, Kemp has described a large mass of this rock as a sheet, or laccolite, the exposures apparently not being sufficiently extensive to permit of certainty in the matter. This is the only known instance in New York where any of these rocks occur in other than the dike form.

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[1] U. S. Geol. Sur. Bul. 107.

*Basic dikes (camptonites, monchiquites and fourchites).* Of these basaltic rocks the main mineralogic constituents are a basic feldspar, usually andesin or labradorite, augite, brown hornblende, olivin and biotite. The camptonites are feldspar augite, or feldspar hornblende rocks; in the monchiquites and fourchites the feldspar retreats or disappears, thus separating them from the camptonites, and they are distinguished from each other by the presence in the former rock, or the absence in the latter, of olivin. Some glassy base is usually present, specially in the latter two rocks, and they not infrequently contain analcite.

Camptonites are mostly characterized by the presence of brown, basaltic hornblende in sharply bounded crystals. It is often more or less replaced by augite, up to complete disappearance of the hornblende. Such rocks differ but little from diabases, the difference being a minor, structural one; in the diabases the augite formed somewhat later than the feldspar and accommodated itself to the feldspar outlines, instead of presenting its own outlines; in the camptonites it formed earlier and is more apt to have its normal outlines. In most cases at least some brown hornblende is present, and serves to distinguish the two rocks. In many of the dikes there is no augite whatever. Magnetite is the only other mineral uniformly present. Some little glassy base is apt to be at hand also.

The monchiquites consist of olivin, augite, hornblende, biotite (one or all three of the last named), and a glassy base. Like the camptonites these are apt to be porphyritic. Analcite is not infrequently present. The fourchites are similar except for the lack of olivin, and consist principally of augite, though with some hornblende or biotite. They are much rarer than the monchiquites in the Champlain district. A related rock, ouachitite, in which the biotite predominates and augite retreats, has not been so far noted in the district, though biotite is abundant in several of the dikes.

*Age of the Champlain dikes.* Kemp was the first to note that these acid and basic dikes of the Champlain region are of the sort which usually accompany nephelin syenite igneous bodies, but that such are absent in the immediate region, though occurring in Canada to the northward, and to the eastward in New England. It is of course possible that masses of the sort are present in the Champlain region but are as yet uncovered by erosion. It would seem however that these Champlain dikes are on the southeast margin of a considerable region which was affected by the igneous action, and that evidence regarding their age may be sought in the entire affected area. In the immediate Champlain region no closer determination of their age can be made than that they are younger than the Utica shale, which some of them cut. There would seem to be no question that they are older than the Trias, or are of Paleozoic age, since the igneous rocks of the Trias are of quite different sort, and rocks like these are nowhere found associated with them. The evidence given by the exposures on St Helen's island, near Montreal would indicate that these rocks are at least as young as the early Devonic; and the writer has recently come to the belief that a Carboniferous age must be assigned to them, though this is not possible of demonstration at the present time.

*Chemical analyses.* No very good and complete analyses of these Champlain eruptives have yet been made, though they closely conform to similar rocks elsewhere. Such as are available are given by Kemp in United States Geological Survey, bul. 107. It is however of interest to note their quite striking similarity in composition to the earlier dikes, which preceded them in late Precambric time. The camptonites and monchiquites are chemically very close to the earlier diabases, and an equally strong resemblance obtains between the bostonites and the syenite porphyries.

*Igneous rocks of the upper Mohawk region.* Smyth, G. H. Williams, Darton and Kemp have described very basic rocks, of the peridotite class, about Manheim, Syracuse and Ithaca.[1] These rocks are only remotely connected with the Adirondack region, but completeness would seem to make desirable some consideration of them. They occur for the most part in very irregular dikes, often of very small width. They belong to the peridotite class of igneous rocks, the most basic of any. Such rocks are prone to rapid decay, and these are no exception, all of the known exposures being considerably, and many of them highly altered and rotted.

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[1] Darton & Kemp, Am. Jour. Sci. June 1895, p.456–62; Kemp, J. F. Am. Jour. Sci. Nov. 1891, p.410–12; Smyth, C. H. Am. Jour. Sci. Ap. 1892, p.322–27: —— Am. Jour. Sci. Aug. 1893, p.104–7; Geol. Soc. Am. Bul. 9: 257–68; Williams, G. H. Am. Jour. Sci. Aug. 1887, p.137–45.

In general their mineralogic make-up is of biotite, olivin, pyroxene and melilite, with accessory magnetite, perovskite and apatite. Wherever sufficiently fresh material has been forthcoming, the presence of melilite has been noted, Smyth having early shown its presence in the Manheim rock and having recently detected it in some new material from the Syracuse vicinity. Alnoite is the name applied to a melilite holding peridotite. All the rock contains biotite and olivin in quantity, but the pyroxene is much more irregular in its occurrence. It is rare or else absent in the Manheim rock; while Kemp has shown that it is the main mineral of the ground-mass in the Dewitt dike near Syracuse. Likely some glassy base was present in nearly all occurrences. In all except the freshest rocks the olivin has gone to serpentine, and Smyth has described in detail the processes of alteration and decay.

*Chemical analyses.* Since these rocks are all considerably altered, analyses of them are not trustworthy if what is sought is the actual composition of the fresh rock. Yet, if the analyses are made from the freshest possible material they will give good evidence of the general character of the igneous magma, and of the closeness of correspondence of the rocks from the separate occurrences.

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| $SiO_2$ | 36.8 | 33.8 | 35.25 | 37.44 |
| $Al_2O_3$ | 4.16 | 6.84 | 6.1 | 28.6 |
| $Fe_2O_3$ | n. d. | 12.26 | 8.53 | 11.92 |
| FeO | 8.33 | n. d. | 5.6 | n. d. |
| MgO | 25.98 | 21.38 | 20.4 | 1.97 |
| CaO | 8.63 | 9.5 | 7.4 | 5.45 |
| $Na_2O$ | .17 | n. d. | .7 | .97 |
| $K_2O$ | 2.48 | n. d. | 2.88 | 1.02 |
| Loss[1] | 12.25 | 15.2 | 12.4 | 12.67 |
| Sum | 100.27 | 98.98 | 99.26 | 100.04 |

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[1] In no. 1 includes $H_2O$+6.93, $H_2O$–.51, $CO_2$ 2.95, $TiO_2$ 1.26, $P_2O_5$ .47, MnO .13; in no. 3 includes $TiO_2$ 2.25.

1 Dewitt dike near Syracuse. Darton & Kemp, *op. cit.* p.461, analyst, H. N. Stokes.

2 Manheim, Herkimer co., C. H. Smyth, *op. cit.* p.325, analyst Smyth.

3 Manheim, Herkimer co., C. H. Smyth, *op. cit.* p.262, analyst Smyth.

4 Ithaca, J. F. Kemp, *op. cit.* p.412, analyst W. H. Morrison; analysis incomplete, and the alumina and magnesia determinations obviously incorrect.

The first three of these analyses are of *fairly* fresh material, when the character of the rock is taken into consideration. They suffice to bring out clearly the close relationships of the rocks from the different localities, as evinced by the low silica and alumina and the very high magnesia. While these characters belong to the general rock group to which these rocks pertain, they are the only igneous rocks of the group known in the State, and therefore clearly represent outflows from the same subterranean source. So far as known, they are confined to the central part of the State, but the three localities are so widely separated that unquestionably others will be forthcoming.

## ROCK STRUCTURES

The rocks of the Adirondack region may be separated into three main groups of widely separated age, owing to the fact that there have been three main periods of rock formation in the region, separated by protracted intervals of wear. The Precambric rocks constitute the first group, the early paleozoics the second, and the pleistocene deposits the third. The last are so recent as to be in substantially the condition in which they were deposited, unconsolidated masses of glacial deposits and of marine and fresh-water sands and clays. A vast time interval separates them from the paleozoics, which are all thoroughly indurated rocks, but which are otherwise not greatly altered from their original condition, though they have suffered somewhat from earth stresses and movements. Another vast time interval separates these from the Precambric rocks, and the latter underwent profound changes in character during this interval. They therefore present structural features which are confined to them, as well as others which they share with the Paleozoic rocks.

### Foliation

In the Adirondack region the Precambric rocks alone have suffered metamorphism, but they are so profoundly metamorphosed, the late dikes always excepted, as to have been vastly altered in character. The change consists, for the most part, in a recrystallization of their constituent particles, destroying their original textures and structures and developing new ones. The Grenville and Saranac rocks are the ones most affected and in large part have their original characters utterly destroyed. In the great igneous masses the changes are not so widespread and profound, so that often there is at least a partial preservation of their original characteristics.

The old sedimentary rocks have lost all traces of lamination and nearly all signs of original bedding; they have undergone complete recrystallization, entirely obliterating their old textures, and, as a result of severe compression, have had a development of cleavable minerals along certain parallel planes, the mineral particles having a common orientation. This gives rise, on the part of the rock, to a capacity to split along such planes, and the structure is a variety of cleavage, and is known as foliation. Sometimes this new structure is parallel to the old bedding planes and sometimes it is not; often the latter can not be made out at all. In general the old limestones, now converted into coarse marbles, are the only sedimentary rocks which are not now foliated. This is because of the facility with which such rocks become crystalline, their rather uniform composition, such that they consist mainly of one mineral, and their comparatively great plasticity under pressure.

The great igneous masses are, in general, much less foliated, though this is not true of many of the smaller ones, and specially not of the older ones, those that seem to be of Grenville age. In considerable part the absence of foliation in much of the igneous rock is thought to be due, as in the limestones, to the fact that the rock is largely constituted of a single mineral. Much of the anorthosite, and to a lesser degree of the syenite also, is quite purely feldspathic, the minerals which are most effective in producing foliation being present in but slight quantity, or not at all. Such rocks are often badly mashed and granulated, indicative of the great pressures which they have experienced, but with no production of foliation. But, with change in the rock composition, with the formation in quantity of biotite, amphibole or pyroxene, more or less foliation is pretty sure to be induced in the rock. In all the large igneous masses, the general more basic character of their peripheral portions has resulted in the formation of such minerals there, hence their tendency to pass over into gneisses at their borders, a tendency so widespread as to be practically universal. The gabbros of the region possess throughout a large proportion of such minerals, and in the writer's experience they, though the youngest of the igneous rocks of the group, are much more uniformly gneissoid than are any of the others. True, comparatively unchanged cores remain in nearly every case, so that the original character of the rock may be demonstrated, but this is usually of small bulk in comparison with the hornblende gneiss, produced from it by metamorphism.

In many of the granites also there is a great scarcity of the foliation-producing minerals, the rock being mainly, or wholly, constituted of quartz and alkali feldspars. These rocks are apt to lack foliation, and then not infrequently have a somewhat similar linear structure, the quartzes being drawn out into spindles and pencils, with a direction corresponding to the foliation direction of the inclosing rocks. A similar tendency may often be noted in the more quartzose syenites. This structure has only been noted in these quartzose rocks, hence a natural tendency to attribute it to the mineral composition. But coupled with that may well have been such slight differences in the mean and maximum pressures in the rock that it suffered nearly equal shortening in two directions at right angles, and elongation merely in the third.[1]

The foliation in the Precambric sediments seems, in general, to be parallel to the bedding, so far as the latter may be made out. Over the greater part of the district the dips are comparatively steep, ranging in general from 20° upward. Judging from the writer's own experience, and from the published data of other observers, the strike is seldom uniform over any considerable area, but is now to the northeast, now to the northwest. North and south, or east and west directions are much more infrequent. The shifting of the strike direction indicates that we are dealing with folded rocks, and that this is actually the case is readily demonstrated in the Grenville sediments, but with difficulty elsewhere. It is also evident that the folds have a considerable pitch, and the writer's impression is that in the northern part of the region at least, the pitch is to the north. The major folds would seem to be broad and not excessively steep, but their limbs are corrugated by minor folds also, and it is in these that the steepest dips are obtained.

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[1] Hoskins, L. M. U. S. Geol. Sur. 16th An. Rep't, p.870.

The great igneous batholites of the Adirondacks are massed in the east center of the region. Going west and south, a zone is passed through marked by increase in Grenville sediments and diminution of igneous rocks. On the west and south the sediments largely predominate. It is in these areas that the folds must be worked out, provided they can be worked out at all. If so, the knowledge thus obtained may be, perhaps, successfully applied to the elucidation of the structure of the more difficult interior area, more difficult because of the much larger content of poorly foliated igneous rocks. The writer's work has been mainly in the latter district. It ought to be possible with good maps and careful areal work, to make out the axes of at least the larger folds. The folding was certainly done in Precambric times and while the rocks were buried at some considerable depth; hence it long preceded the period of diabase eruption, and these dikes are wholly unaffected by it.

### Folds

Aside from the folding of the Precambric rocks, just noted, which was produced in Precambric times, the rocks of the region are but slightly folded. Along Lake Champlain the Paleozoic rocks are thrown into a series of very gentle folds, which have subsequently been so much faulted that the folding is not always apparent. Across the lake in Vermont the folds become rapidly more pronounced, but on the New York side only a trifling amount of folding has taken place. The dips are in general very low, and in many cases so flat that they are made out only with great difficulty. They are almost always below 10° and usually below 5°. In the few instances where they are steeper, the cause is usually found to be the tilting of a small fault block, or drag in the vicinity of a fault. A steep dip may usually be taken as an indication of proximity to a fault. However, the rocks are unquestionably slightly folded, marking in all probability merely the waning effects of the force which produced the greater folds to the eastward. So far as observed, the folds trend nearly north and south. Minor folding, of sometimes considerable amount, is often observed in the near vicinity of faults, and in many cases at least is a result of the faulting, being apparently due to differential movement along the fault plane.[1] Such folds are small and rapidly die out with recession from the fault plane.

Westward, along both the north and the south sides of the region, evidence of folding is progressively less evident. That there are low undulations of the strata can not be doubted, but such are found in nearly all districts, of even the least disturbed rocks, and can be located only with the most painstaking care, if at all. Slight local folds, sags is a better term, are not uncommon in the limestones of the Mohawk valley, but seem to be local and not regional structures.

### Faults

**Precambric faulting.** The location and tracing out of faults in the Adirondack Precambric is an exceedingly difficult task, and, in so far as they have been located, their recognition has depended more on topographic than on structural evidence. The discrimination between Precambric and later faulting is trebly difficult, and for the most part has not been attempted. Practically all topographic indications of Precambric faults must have been obliterated during the protracted period of Prepotsdam wear on the then land surface of the region. At the present day large faults of the sort could be most readily detected at the Precambric margin, by showing that the overlying sediments had not been affected by the process. No such evidence has yet been forthcoming so far as the writer is aware. Yet there does seem to be evidence of at least some Precambric faulting.

In the eastern Adirondacks, where diabase dikes abound, it is a frequent experience to find them faulted. Often the same dike will be faulted more than once within comparatively small distance. The recognizable faults of this sort are usually of very small throw, or at least of small heave, the dikes being shifted laterally a few inches, or a few feet. More rarely the fault is of sufficient dimension to cause the disappearance of the dike on one side, its new position being beyond the limits of the outcrop.

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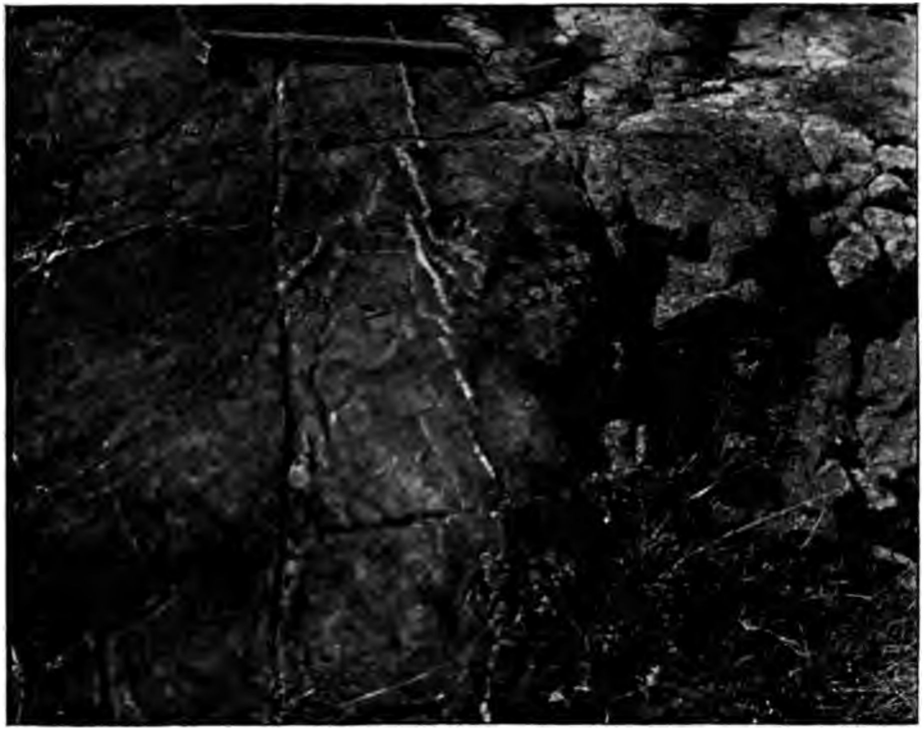
[1] Folds of this sort are shown on most of Brainard and Seeley's excellent sketch maps of bits of the Champlain region. See for example Am. Mus. Nat. Hist. Bul. 8:309-11, and Am. Geol., November 1888, p.326.

Since these dikes are themselves of late Precambric age, the fact that they are faulted would indicate a very late Precambric age for the faulting, provided it is Precambric at all. The only evidence of such age is the fact that the later faults, so far as they have been made out, are less numerous and of larger throw. While this is suggestive, it is but slender evidence for making such a discrimination.

As will shortly be shown, joints abound in the Precambric rocks. In numerous instances evidence of vertical slipping along these joints is forthcoming, the immediate rocks being much crushed and sheared, and the planes of slip thoroughly slickensided. Excellent illustrations may be found in the numerous rock cuts along the railroad between Saranac Inn and Floodwood, in Franklin county. The anorthosite is seen to be locally much shattered, abundant joints dividing it into parallel sheets of a thickness of from 2 inches to 4 inches, the rock material much crushed and sheared and the sheets slickensided on both surfaces. The whole zone so affected varies from a few feet to a few yards in breadth, grading off into the normal rock. The frequency of the phenomenon in these excellent exposures suggests that it can hardly be local, and that the fact that it has not been more widely noted may likely be owing to the general poor and unsatisfactory character of the usual exposures in the woods. That, in other words, it is a common occurrence.

Here again the evidence that the faulting may be of Precambric age is merely the difference in character. The Paleozoic faults are fewer and of large throw, and so far as noted do not consist of numerous small slips along closely recurring joint planes, with the production of a multitude of slickensided surfaces. Here again the evidence is far from conclusive. There is however a system of joints in the Precambric rocks which antedates the Paleozoic, since there are more joint systems in the former than in the latter rocks. If it could be demonstrated that the system of joints along which this faulting took place was

**Plate 11**



Faulted granite dike, near Westminster park, Wells island

formed in Precambric times, the case for the age of the faults would be made out, but this has not yet been successfully done.

Kemp has described three diabase dikes cutting the ore body in the Hammondville iron mines, which he says fault the ore, raising it about 15 feet in each case.[1] The dikes appear not to be faulted. If this be true, the faulting could hardly have been later than the time of dike extrusion. A later fault might, it is true, have paralleled the dike, but that this was the case ought to be readily made out in the exposure. This would seem therefore to be a veritable instance of Precambric faulting.

The older Precambric dikes of the region, more specially the granite and pegmatite veins, are not infrequently found faulted repeatedly and in small amounts, as the diabase dikes are [pl. 11]. Precise evidence of the date of faulting is equally lacking here.

On the whole then it is to be said that, while demonstrative evidence of Precambric faulting to any special extent has not been forthcoming, it is nevertheless quite probable that such was the case, the faulting having occurred in rather late Precambric time, when, owing to the long continued surface erosion, the originally deeply buried rocks had been transferred from the deeper zone of flow to the superficial zone of fracture.

**Paleozoic faults.** As such may be classed in all probability all faults found in the Paleozoic rocks and many of those in the Precambric. Faulting may well have been initiated in the region at the time of the uplift which terminated Lower Siluric deposition, and which was most marked on the east, being there accompanied by some considerable disturbance of the rocks. The great earth disturbances which prevailed in the Appalachian zone toward the close of the Paleozoic would seem more likely to have brought about the major faulting of the region. To the east and south of the district there was a time of disturbance, resulting in prolific faulting, in the Mesozoic; but, if the region in question was also affected, the results can not be discriminated from those produced in the Paleozoic. However, the Champlain and Mohawk faults are of a different type from those which abound in the Newark Mesozoic of New England and the Middle Atlantic states, which is evidence against their being classed together.

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[1] U. S. Geol. Sur. Bul. 107, p.40.

In the eastern Adirondacks there is some evidence of yet more recent faulting, which may have utilized the already formed fault lines, or constructed new ones, the former seeming the more probable supposition, though it is in general impossible to say which was the case. So far as known to the writer, the evidence for this later faulting is topographic simply, certain prominent fault scarps being difficult of explanation except on this assumption.

These Paleozoic faults are for the most part readily made out in the marginal belts of Paleozoic rocks of the Champlain and Mohawk valleys. They are not so readily discoverable on the north, owing to the very low northward dip of the Potsdam and Beekmantown formations there, the great thickness of both these formations and the northerly slope of the surface in the same direction as the rock dip, giving them great breadth of outcrop; while their various beds are so similar lithologically and so unfossiliferous that precise horizons are not to be made out, in a district of such scanty outcrops. Enough evidence can be obtained however to show that the faults do occur, and that the conditions are quite like those on the south side of the region. The strong probability is that the faults, or rather the faulting, extend clear across the region. Evidence of their presence is frequently forthcoming in the Precambric areas, but in these it will require the closest sort of areal work to disclose and to map them accurately.

Faults most abound and attain greatest magnitude along the eastern border of the region. Thence westward they diminish in number and in importance, though large faults occur as far west as Little Falls in the Mohawk region, and at Potsdam on the north, and small ones, at least, are found still farther west.

The greater breaks of the region are meridional, trending from a north-south to a northeast-southwest direction. They therefore rudely parallel the strike of the Paleozoic rocks in the Champlain region, while in the Mohawk region, and on the north, they cut it at a high angle, forming what are known as dip faults, the others being called strike faults [fig. 3, 4]. The large majority of them downthrow to the east and with their rude parallelism divide the region into a series of strips, or slices, this slicing apparently characterizing the bulk of the Adirondack region.

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In addition to these greater, meridional faults, differential slipping in the fault strips has resulted in the production of a multitude of cross faults, trending away from the greater ones at all angles, downthrowing now to one side and now to the other, and thus dividing the strips into a number, often a large number, of blocks of varying size and shape, producing great confusion in the stratigraphy and tending to disguise the larger features of the region. These are mostly a feature of the Champlain region and have not the persistence westward of the meridional breaks.[1] As a general rule, they have a somewhat east and west trend but with wide variation in direction. They downthrow now to the north and now to the south, with frequent production of small sunken blocks, downthrown on both the bordering faults. They are in general dip faults, shifting the rocks along the strike, while the large strike faults are apt to cause disappearance of a considerable part of the rock section of the district on the two sides of the fault [fig. 3, 4]. Thus along the great Tracy brook fault, in Chazy township, the entire Beekmantown formation is faulted out, bringing the Chazy and Potsdam together on opposite sides of the fault. A small portion of the course of this fault is shown on the accompanying map [pl. 12]. Just within the map limits its course is more nearly northeasterly than is usual with the great faults and more nearly so than is the case with most of the course of this special fault. About 1 mile to the southeast a parallel fault is seen, and the strip which intervenes between the two is intricately cut up by a number of cross faults, much more so than is true of the district adjoining the strip on either side. Along this pair of faults the entire Beekmantown formation, at least 1500 and likely 1800 feet in thickness, is faulted out, together with an unknown thickness of the Potsdam, from 100 feet to 300 feet at least, and a portion of the Chazy, so that the throw of the fault is 2000 feet or more. It is not a true strike fault, since the dips hereabout are swerving from an easterly, to a northeasterly or northerly direction, but they are so low that the general effect of disappearance of a certain thickness of strata from the

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[1] The Mohawk valley faults and some of the larger Champlain faults are well shown on the large geologic maps of the State. The two large scale maps of portions of Clinton county [pl. 12, 18] better illustrate the general character of the faulting in the Champlain district.

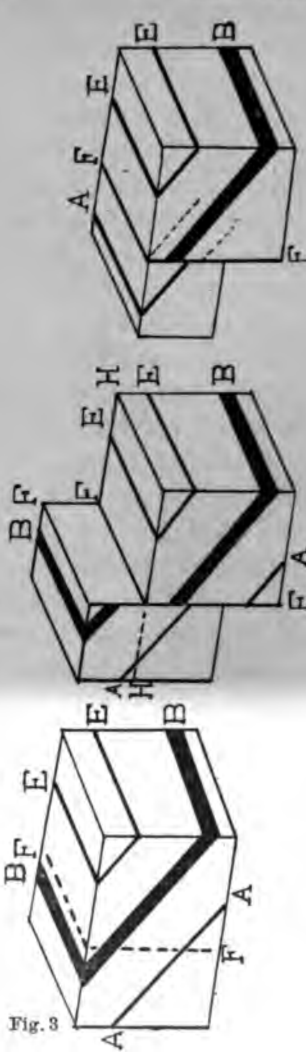


Fig. 3

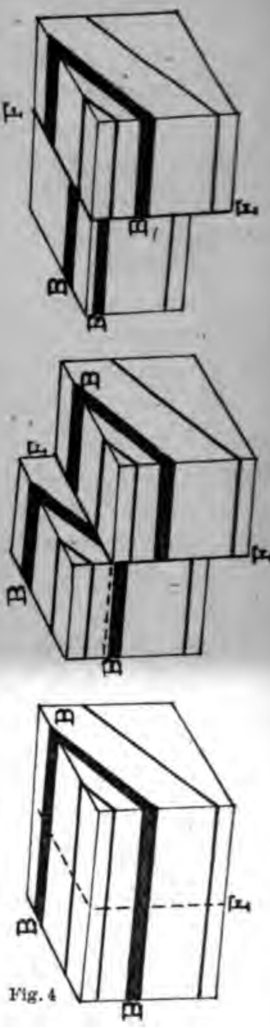
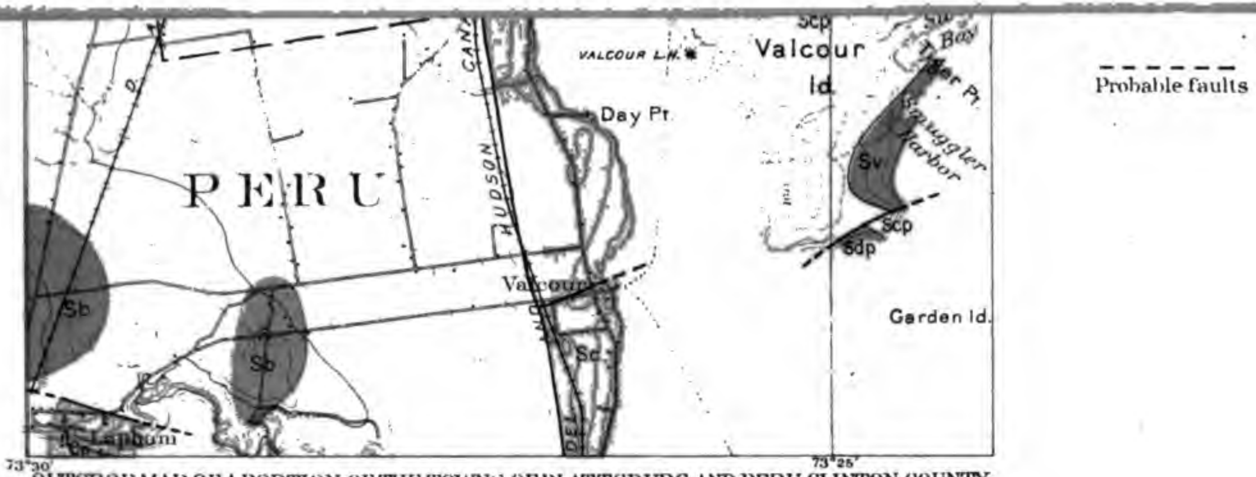


Fig. 4

Figure 3 illustrating a strike, and figure 4 a dip fault. FF is the fault plane, AA, BB, and EE indicate the dipping rock layers. In the former figure the fault plane cuts the surface parallel to the strike, causing a strike fault, in the latter the strike is cut at right angles, producing a dip fault. On the left the unfaulted block is shown, with the position of the fault dotted. In the center the conditions prevailing shortly after completion of the faulting are shown, the downthrow block on the right, and with the prominent fault scarp. On the right the conditions prevailing after sufficient time has elapsed for wearing away the upthrow block down to the level of the other side, or rather for wearing the two sides down to a uniform level, are indicated, this being approximately the condition of most of the faults of the region at the present time. In the strike fault this results in the entire disappearance from the surface of the stratum BB, in the vicinity of the fault, the actual thickness of rock so disappearing being comprised in the space between the dotted lines on either side of BB. By varying the amounts of hade and dip, or their directions, repetition of strata at the surface, instead of disappearance, may result. In the dip fault the effect is to shift the outcrop of a given stratum, so that in an old fault, the surface having been worn down, the ends are shifted forward or back, as the case may be, on opposite sides of the fault, as BB is shifted in the diagram. The amount of this shifting increases with increased throw of the fault, and diminishes with increased dip of the rocks. Few faults meet these conditions of correspondence with dip or strike direction exactly, but many make such slight angles with these directions that they are practically fulfilled.



OUTCROP MAP OF A PORTION OF THE TOWNS OF PLATTSBURG AND PERU, CLINTON COUNTY,
SHOWING THE FAULTS, SO FAR AS THEY HAVE BEEN LOCATED
by H. P. Cushing
1904.

Scale $\frac{1}{62500}$

1 ½ 0 1 2 3 4 Miles

Contour Interval 20 feet.

*Datum is mean Sea level*

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surface is similar. The small fault blocks in the intervening strip have been updragged by the faulting, giving them a pronounced dip, in general 10° or more, away from the fault plane toward the southeast. Hence the faults that cross the strip are quite typical dip faults, and the lateral shifting of corresponding beds on the two sides of a fault is plainly brought out on the map. Owing to the steep dip, the more resistant rock layers involved appear as low, sharp backed ridges, and the lateral shifting of these, as a fault is crossed, is a prominent, minor feature of the topography. In the most northerly pair of these faults shown on the map, the north one throws to the north and the south one to the south, so that the middle block has been upthrown between the two others. Just the reverse is true with the pair just south of Chazy village, the middle block having been downthrown between the two adjoining blocks. On the east and west edges of the map faults are not indicated simply because outcrops are not sufficiently numerous, or sufficiently definite, to permit of their location. That they are there is quite certain.

Plate 13 shows the faults in a portion of Plattsburg and Peru townships, so far as the outcrops will admit their being located. One very extensive fault of the meridional class, the Plattsburg fault, runs across the map limits from north to south, exposing Beekmantown rocks constantly on the west side and either Chazy or Trenton on the other. The throw of the fault causes the disappearance of the major part of the Beekmantown formation and may be safely set down as at least 1000 feet. Toward the north the throw diminishes, and another great fault develops, the Beekmantown fault, the two coalescing at the north limits of the map and extending on beyond as a single fault of very large throw. Between the two a wedge of Chazy is brought up, with Beekmantown rocks on one side and high Trenton on the other. At the point of junction the Chazy is pinched out and the Beekmantown and Trenton rocks adjoin across the fault. There are two cross faults in this Chazy wedge, two on Valcour island, one on the mainland at Valcour and another just north of Bluff point, as well as several small ones in the shales on Cumberland head, and one on the south edge of the map at Lapham, which brings up the Potsdam against the Beekmantown. Lack of outcrops prevents the location of others.

Such conditions everywhere characterize the country along Lake Champlain. Wherever any bit of it has been mapped in detail, one or more faults are sure to be disclosed. They constitute the most prominent and characteristic structural feature of the region.

The faults of the Mohawk valley have been most carefully studied and described by Darton.[1] They are inferior to the greater Champlain faults in number and in size, and the numerous cross faults which characterize that region are less manifest or are lacking here, the faults all having a north to northeast trend, with rude parallelism. Four large faults only, cross the Mohawk valley, the Hoffman, Noses, St Johnsville and Little Falls faults, [pl. 14] though there are several minor ones of less magnitude and extent. Others occur to the northeastward in the Saratoga region, and there must be still others which remain yet undiscovered.

None of these faults have been traced to any distance on the south side of the Mohawk valley, and it is not certain whether they disappear there, owing to dying out, whether they are there but are difficult to trace, owing to unfavorable conditions, or whether they apparently disappear because the overlying Upper Siluric and Devonic rocks were not affected by them. The matter is of importance as giving evidence of the date at which the faulting took place. So far no rocks younger than the Utica and Lorraine shales are known to be involved. If it could be shown that the younger rocks to the south of the valley were also affected, the probability of their Carboniferous age would be much strengthened, or at least any correlation of their date with that of the Taconic disturbance would be rendered impossible.

The only one of these great Mohawk faults with which the writer is on terms of intimacy is the Little Falls fault. With the remainder he has but passing acquaintance. According to Darton all are normal faults with nearly vertical hade, and all downthrow to the east, with the single exception of the comparatively small Dolgeville fault. The throw of the Little Falls fault, where it crosses the Mohawk, is not far from 800 feet, and it maintains approximately the same throw for several miles to the northward. The St Johnsville fault has branched and is fast diminishing in

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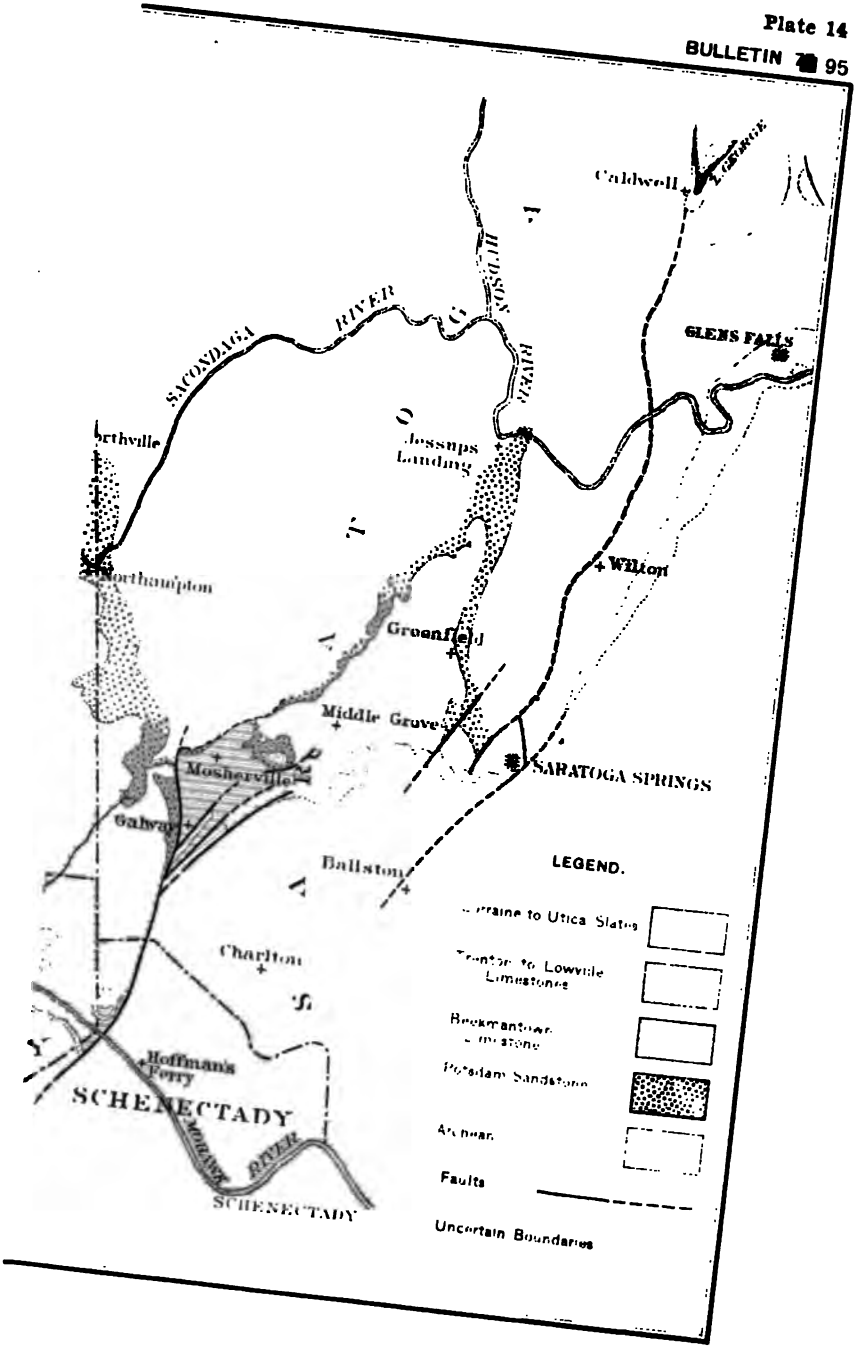
[1] *14th An.* Rep't State Geol. 1894. p.33–54.


Caldwell
LAKE GEORGE
HUDSON
RIVER
SACONDAGA
RIVER
SARATOGA
Northville
Northampton
Jessups Landing
Wilton
GLENS FALLS
Greenfield
Middle Grove
Mosherville
Galway
SARATOGA SPRINGS
Ballston
Charlton
Hoffman's Ferry
SCHENECTADY
MOHAWK
RIVER
SCHENECTADY
LEGEND.
Lorraine to Utica Slates
Trenton to Lowville Limestones
Beekmantown Limestone
Potsdam Sandstone
Archean
Faults
Uncertain Boundaries

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throw near the river, but it increases rapidly northward, Utica shale on the east side adjoining Precambric rock on the other, so that the throw there would seem of equal magnitude with that of the Little Falls fault. The Noses fault involves the entire thickness of the Beekmantown and Trenton formations, the latter only 17 feet thick here, together with an unknown amount of the Utica. The two former aggregate 500 feet, so that a minimum value is thus given, to which must be added the thickness of Utica involved. According to Prosser the Hoffman fault throws out the entire Utica and Trenton and some of the Beekmantown, so that its throw is just about 1600 feet.[1] It is, then, the greatest of the Mohawk faults, as it is also the most easterly.

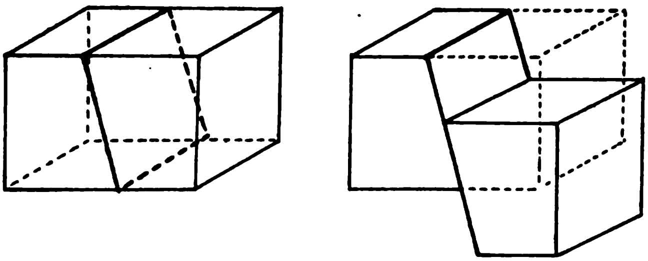

Fig. 5 To illustrate extension owing to normal faulting. First, the unfaulted block is shown with the position of the fault plane, second, the block after faulting, with the original position dotted. The lateral extension, or heave, is manifest. The hade of the fault is 15° and the lateral extension about one fourth of the vertical displacement.

This whole faulted district closely adjoins on the west the district of Appalachian folding. This is a region of sharply compressed rocks, producing folding and thrust faulting. The region under consideration was but slightly affected by these forces, thrust faults being absent and folds present only in the most minor degree. Normal faults are however abundant, in fact are present in both districts. But normal faulting implies surface tension instead of compression, since, except in cases where the hade is absolutely vertical, the rocks have greater lateral extent after the faulting than before [fig. 5]. Since absolutely vertical faults are exceptional, much normal faulting in a district of parallel faults must produce a respectable amount of surface extension. The period of tension would seem to have followed that of compression, as is apt to be the case, and this also argues for the late Paleozoic date of the faulting.

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[1] *N. Y. State Mus.* Bul. 34, p.476.

### Joints

All the rocks of the region are cut by joints, but they are specially abundant in the Precambric rocks. Since joints can be formed only in the zone of fracture, their development in these rocks must have been long subsequent to the formation of folds and of foliation, during which interval the rocks had been approaching the surface because of wearing away of what was above. The joints which are found in the Precambric rocks and not in the overlying paleozoics must be of Precambric age.

Joints may be produced either by compression or by tension. Those of the latter sort are usually vertical or nearly so, while those of the former may be either vertical or inclined. The simplest case of tension jointing is the production of columnar joint cracks in igneous rocks owing to contraction on cooling. Some of the joints of the dikes of the region are of this class, it being the invariable experience that they are more excessively jointed than are the inclosing rocks. The solidifying and cooling of the great igneous masses of the region, however, took place at such great depths as to be below the zone of fracture, and hence they lack joints of this character, being neither more nor less jointed than are the neighboring gneisses.

Tension joints may also be produced by the desiccation of marine sediments underground, and this cause may have operated somewhat in the production of joints in the Paleozoic rocks, though it is doubtful.

Another very likely cause of the production of tension joints is the slow reduction of temperature brought about in rock masses as they approach the surface because of the slow removal by erosion of the overlying rocks. Though the process is an exceedingly slow one, and the changes of temperature involved are not large, yet, considering the great areal extent of the rocks concerned, the necessary contraction would seem considerable, and likely to much exceed the elastic limit of the rocks.

Where rocks are folded in a complex manner, as is usually the case, torsional effects are sure to be produced, which result in the production of two sets of joints, one running parallel to the axes of the major, and the other to the axes of the minor folds.

Compression of rocks in the zone of fracture may give rise to jointing which follows the shearing planes. There would be two different joint sets, which would cut the surface parallel to each other. Such joints would be inclined instead of vertical, the amount of inclination depending on how largely the shear was determined in direction by preexisting planes of weakness, such as bedding or foliation planes. In simple folding both sets of such joints would be parallel with the strike of the beds, one dipping with, and one against them.

The Adirondack Precambric rocks are much jointed. It is however a difficult region in which to obtain accurate measurements of the hade of the joints, though observations on the strike are easily obtained.[1] Moreover, in much of the district the rocks are igneous and poorly foliated, baffling any efforts to determine the structural significance of the joints. The writer's observations have been mainly made in such districts and are not yet sufficiently extended and worked out. Certain things are however clear.

The Precambric rocks are much more conspicuously jointed than are the overlying paleozoics, implying a time of joint formation prior to the deposition of the latter.

Joints are not equally conspicuous in all of the Precambric rocks, being least prominent in the limestones, and most so in the great igneous masses, implying some joint formation while the rocks were at sufficient depth to render the weak limestones somewhat plastic, though the igneous rocks were thoroughly rigid.

Four sets of joints are usually to be made out in the Precambric rocks, though all four are seldom present in any given exposure. Though varying considerably in direction from place to place, they can be apparently referred to two main sets, the one consisting of a pair of north-south and east-west joints and the other of a pair of northeast and northwest joints, both sets swerving in direction through 15° or 20°. In some exposures one set is the more prominent, in some the other set; in many at least three of the four show, and not infrequently all four. The north and east joints are usually vertical, or nearly so, while the others frequently show a greater hade. Not uncommonly, specially in the great igneous masses, a nearly horizontal set also appears, but this is more intermittent and less regular than the others.

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[1] *As in the case of a fault, the hade is the angle of inclination from the vertical.*

Since the usual foliation strikes of the region are either to the northeast or to the northwest, it is likely that the inclined joints in those directions represent compression joints in the shearing planes, these being more or less controlled by the foliation. An instance of the sort is illustrated in plate 15. The cliff there shown is a joint cliff, with a n. 50° w. direction, an important joint direction in the vicinity. Two sets of inclined joints cut the face of the cliff, both of which have a strike of n. 30° e. The one has a fairly uniform hade of 35° to the northwest, while the other is much more irregular, often swerving into a horizontal position, but in general hading to the southeast. The rock is augite syenite, with a very rude and imperfect foliation, which strikes about n. 40° e., closely approximating the strike of the joints. At the right of the view another joint set appears with a n. 70° e. strike and a hade of 15° to the south, and there is yet another nearly vertical set, not appearing in the view, which has a n. 20° w. strike. It would seem very likely here that the n. 30° e. joints are compression joints, produced in the shearing planes.

Such instances as the above are rather exceptional, however, and the usual, nearly vertical joints which prevail throughout the region have not yet been successfully classified.[1] That at least an east-west system had been developed in Precambric times is indicated by the prevalence of that trend in the diabase dikes. They vary from it through 20° or 30° both to the north and south, but within those limits have it so uniformly as to indicate not only the presence of a fissure system with this trend, but also that this set constituted the line of least resistance to the upward movement of the molten rock. This might have been because this was the only, or the best developed set, but more likely the use of it to the exclusion of other sets was determined by the direction of the side pressure which prevailed at the time.

That minor faulting has often occurred along these joints has already been set forth. It has not yet been determined whether

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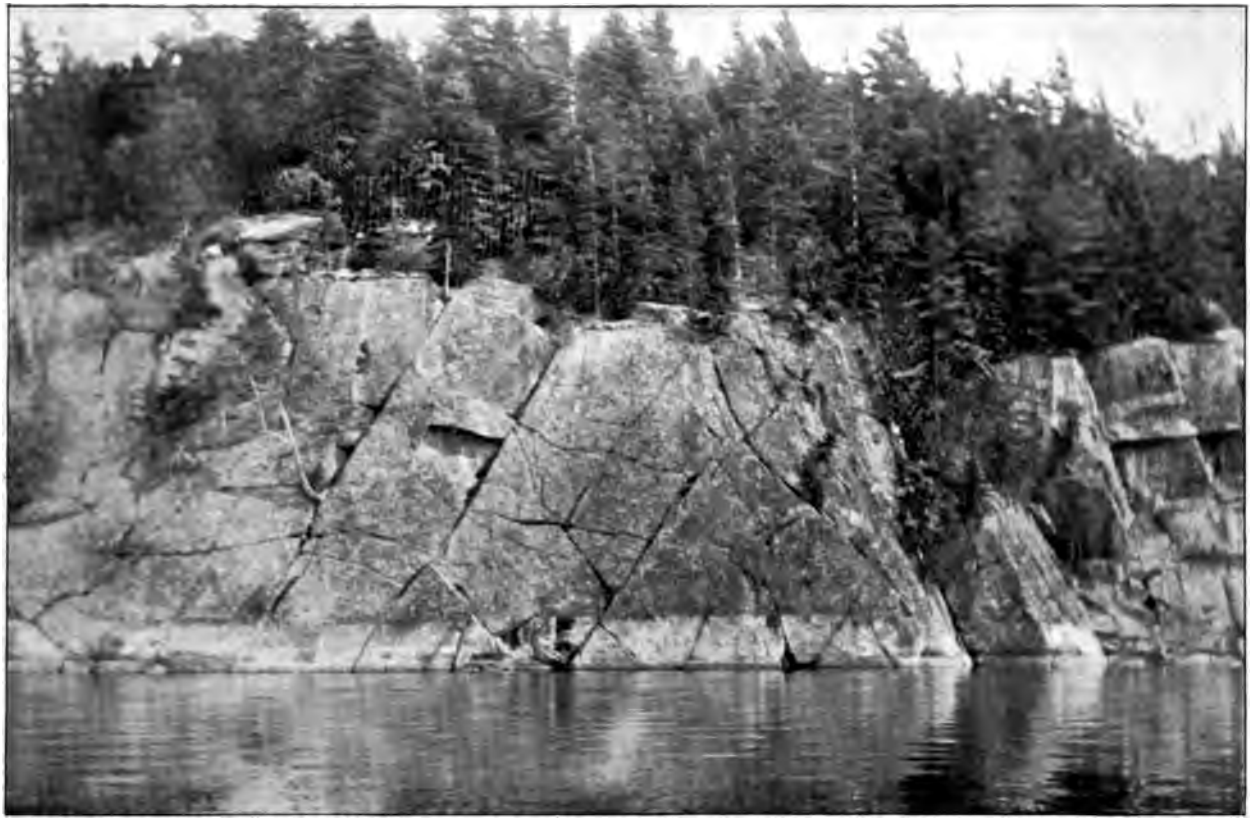
[1] Such for example as the n. 50° w. series of plate 15, well shown also in plate 16, a nearly vertical set which is quite persistent over a very large area in the mid-Adirondack region.

**Plate 15**



Cliff at southwest end of Bluff island, Big Tupper lake, showing joints, the cliff face itself being along a n. 50° w. joint

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this slip faulting is of the normal or reverse type, that is, whether it took place under conditions of tension or of compression. But the whole aspect of the exposures indicates the action of compressive forces. The best localities for observing the conditions are in the rock cuts along the New York Central and Hudson River Railroad west of Saranac Inn station. All of these show the anorthosite to have been much shattered and sheared, with alteration of the feldspar to saussurite where the action has been most violent. There are four main sets of joints shown in the exposures: a nearly vertical n. 50° w. set, the steadiest and most persistent of all; a nearly vertical n. 80° e. set; a somewhat erratic set, shifting from n. 45° e. to n. 15° e. and not vertical; and a n. 20° w. set, often with a hade as high as 40°. The two latter are the ones which show shearing and slickensiding, and more specially the last one. The shearing planes are closely spaced, dividing the rock into very small blocks, and the minerals are much broken and brecciated. Both these sets appear to be compression joints, representing likely two different periods of compression, and the effect of the shearing would be much more likely to produce compression faulting than tension faulting. The brecciated rock recalls other brecciated strips of the region, notably those described by Kemp from Hammondville, Essex co.[1] These breccias sometimes have a chloritic matrix, but more often one in which quartz and chalcedony predominate and form hard, resistant rocks, so different from the rather loose masses of fault rock which characterize the Paleozoic fault planes of the region that they would seem unquestionably to be much older. That they mark lines of faulting is certain, and the Precambric age of this faulting would seem beyond dispute.

The Paleozoic rocks are invariably jointed, but in general but two sets are to be made out, they being vertical and at right angles to each other. They show a somewhat varying direction, but usually the more prominent set has a north-south trend, with the minor one running east-west. They are most irregular and least clean cut in the massive Potsdam and Beekmantown beds. They have approximately the direction of two of the sets in the Precambric rocks, but, because they appear less well marked, some hesitancy is felt in ascribing both to a single time of joint formation, specially in view of the evidence for the prior existence of at least an east-west set in the Precambric rocks. It is inferred rather that the coincidence in direction is merely a coincidence.

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[1] 13th An. Rep't State Geologist, 1893. p.456.

In the shaly rocks of the Cumberland head series, in the vicinity of Lake Champlain, the stresses which accompanied the folding of the district to the eastward were sufficiently felt to produce cleavage in the weak shales, though the more massive limestones and sandstones beneath were not affected. These shales are found cut by closely parallel cracks with hades of from 30° to 60°. The beds lie nearly horizontally, and this cleavage angle indicates rather a formation of fissility along the shearing planes than a true vertical cleavage in the compression plane. Sharply cut, vertical joints are also present, often in three directions. While the writer has never observed a like structure in any of the Champlain Utica which he has seen, yet the Utica always shows more indications of compressive disturbance, so far as folding is concerned, than any of the remaining Paleozoic rocks of the region. The explanation is undoubtedly to be found in the weak nature of the rocks as compared with the massive, resistant limestones and sandstones beneath, so that folding and shearing were produced in them by forces insufficient to affect the others correspondingly.

## TOPOGRAPHY

### Introduction

The topography of any old land area is a resultant of the joint action of two great sets of processes. Arising from beneath sea level with the comparatively smooth surface which it possesses because of the rather uniform deposit of sediments on it, it becomes at once subject to the erosive processes which hold sway on all land surfaces, in which atmospheric and aqueous agencies act jointly, but in which running water plays the major role. From time to time it falls under the influence of forces such as that which originally brought it above the sea level, forces originating in the earth's interior in ways not well understood. These vary its altitude with respect to that level. The forces of erosion work incessantly and according to stereotyped methods, but cease their activity at sea level, hence tend to wear down the lands to a gently sloping surface, rising inland with recession from the shore line. The longer these agents are permitted to work at this task, without interruption from the other set of forces, the larger the proportion of the whole task which will be accomplished. The streams will progressively cut their valleys down to this slope, or grade, after which the work consists mainly in valley widening, bringing a steadily greater amount of the region down to the new level, with a constantly diminishing portion remaining at the old. During the progress of the work a varied topography will be produced, depending on a host of minor factors, rock arrangement and rock resistance being the two most important. The weak rocks will yield most quickly, and many of the streams will adjust themselves to these weak rock belts. The more resistant rocks will persist longer at the old levels, hence tending to become stream divides. The weak belts may be owing to weak rocks or to structural lines of weakness. The rock dip is a most important matter in determining the character of the valleys and uplands. Where it is gentle, flat topped divides and a tendency to radial valleys result. Where it is steep, parallel valleys and sharp backed ridges are produced.

Given sufficient time, the resistant rocks slowly reach the lower level, and the surface becomes comparatively smooth, the interstream areas having low, gentle slopes, with perhaps here and there a low hill or ridge of extraresistant material. Beginning as a plain, the district reappears as a plain, though less smooth than before. Such an erosion surface is known as a peneplain.

If now this process of wear is interrupted at any stage by an oscillation which changes the relative level of land and sea, the grade of the streams is altered, and the whole erosion process must recommence its work with reference to this new grade. If the movement be an upward one, the streams at once commence the task of cutting down the region to this new level, leaving their old task in the condition in which the beginning upward movement found it. Such portion of the region as had *been worn down* to grade, will carry this evidence of graded condition upward with it to the new level, where it will persist for a considerable time and furnish evidence of a former graded condition at the lower level, as well as that the level has since been uplifted; its altitude above the new grade which the streams reach will also give the vertical amount of the uplift for the locality.

## Prepotsdam topography

During the long existence of the Adirondack region as a land area, it has twice remained at a given level for a sufficient length of time to permit the reduction of almost its entire surface to the graded condition. The first occasion was in Prepostdam times, and the comparatively smooth surface on which that and the succeeding deposits were laid down, as shown on all sides of the region wherever this surface can be seen passing beneath the Paleozoic rocks, is the result. At the beginning of Potsdam time the district seems to have presented the aspect of a low, irregular dome, whose slopes were the gentle ones of the stream grades, and whose longer axis, or main watershed, extended across the region in a southeasterly direction, along a line running from a little north of Watertown to a little south of Albany, and also extended northwesterly into Canada. The streams drained away from it in all directions, but principally to the northeast and southwest. This axis does not divide the present Adirondack region into halves, but lies well toward its southwestern border, so that, at the commencement of Potsdam time, the sea was close at hand on the northeast Adirondack margin, but was many miles distant from that on the southwest; consequently the depression carried the one area below sea level, while the other still continued as a land area. This effect was accentuated by the more rapid subsidence on the northeast. Thus the sands, carried down by the streams and washed about by the waves, are now found only on one side of the district; on the other they did not reach the region, and now lie miles away from its margin, buried deep under newer deposits.

The surface covered by the Potsdam deposits on the north and east sides of the district, is found to be much rougher than that on the southwest, which remained unsubmerged during this time and was not reached by the sea till the following Beekmantown, or Trenton; and it is thought reasonable to suppose that this greater smoothness is owing principally to this added length of time during which it was undergoing wear. Its irregularities are comparatively few and small; it seems a quite typical peneplain. On the north the irregularities are many and often considerable; are the rule rather than the exception. The surface is quite hummocky and hilly, and the contact line an irregular one. The supposed evidence is perhaps exaggerated in importance, owing to the possibility of undetected faults in certain localities, but is abundant even should all doubtful evidence be eliminated. It does however seem to be true that the irregularities are mostly of a minor order of magnitude, so that, when the tremendous thickness of rock material which was removed in this Precambric interval is taken into account, with the several uplifts, and the quite respectable altitude at times which are thus indicated, the surprise is not that the surface is so rough, but that it is not vastly rougher. Maximum differences of level of but a few hundred feet are all that are involved, and these comparatively seldom. Whether the surface were not sufficiently smooth to be worthy of the name peneplain, is merely a matter of the personal conception of such a surface which different individuals may hold.

The writer has shown that, in the Little Falls region, the present inclination of this old surface is about 100 feet per mile toward the south. The Beekmantown and Trenton rocks which rest on it have a present dip in the same direction of about 70 feet to the mile; whence, if we assume that they were deposited in a horizontal attitude, we obtain a slope of 30 feet to the mile as that which the old surface possessed at the time when the Paleozoic rocks were deposited on it. While this is a gentle slope, it is too steep for one graded by stream action and suggests that the movement of depression itself resulted in some further tilting of the surface. Little or no direct evidence has been obtained in other districts as to its amount of slope.

### Paleozoic topography

If the Utica sea overswept the entire region, and all the available evidence seems to indicate that it did, then the region arose from beneath sea level with a smooth, constructive surface whose slopes *depended mainly* on the character of the uplift. But of this we are in almost entire ignorance. Nor is there any evidence as to the altitude above sea level given to the region. Subsequent depression and deposit on the southern flanks of the region indicate that much of it had slopes to the south and southwest. How much effect the Taconic uplift may have had on the eastern border is a question, but the possibility of a sagging along the line of the Champlain valley, implying an easterly slope to the eastern part of the region, must be kept in mind. It seems therefore likely that the original character of the region, that is a low, domelike elevation, which slowly sank beneath the encroaching waters of the various early Paleozoic marine invasions, till it was finally overtopped, was renewed by this Postutica uplift, and that the elevation was of the low dome type. Its apex, however, was likely shifted from its former position in the southwest and moved northeastward. The effect of such an uplift would be to increase somewhat the slight initial dip of the sediments outward from the dome in all directions. An alternative view is that the region was merely an extension of the land areas which certainly existed to the north, and to the east during this time, and that it thus sloped, as a whole, to the southwest. In either case drainage would set up on the new surface, and would consist at first principally of streams which flowed down the sloping surfaces, or across the strike of the underlying rock beds. As they cut valleys, tributaries would commence to form, and these would adjust themselves to the rock beds, developing mainly on the weakest and flowing along their strike. With further uplifts, if such occurred, these would tend to extend themselves at the expense of the smaller original streams and lead them off as tributaries to the larger ones.

The Paleozoic cover on the old Precambric floor could not have been thick over the central portion of the region, and would likely have been first cut through there, reaching the resistant Precambric beneath. The area thus exposed would slowly increase in size, faced constantly on all sides by the retreating margins of the overlying rocks. These not only were of unequal resistance, but progressively increase in resistance downwards. Thus the Utica is weaker than the Trenton, that than the Beekmantown, while the Potsdam is most resistant of all to wear.

Consequently each would tend to be stripped away somewhat more rapidly than what lay beneath; thus a terrace would be produced on the bared surface of each more resistant layer as the weaker material above was removed [fig. 6]. This is the general character of topography which is everywhere produced in districts where the rocks lie nearly flat, are of unequal hardness and are undergoing wear. How much progress was made in its production, and how great an area was stripped of its Paleozoic cover during this special interval, it is impossible to say. With the passage of time, and with the increased possibility of wear brought about by later uplifting, the fronts, or infaces, of these terraces would steadily retreat away from the center of the region, without however changing their general character. They are today prominent on the south and west sides of the district, where they are accompanied and influenced by the infaces and terraces of the later Paleozoic rocks which there overlie them. On the east and north they are not conspicuous, owing to a variety of causes.

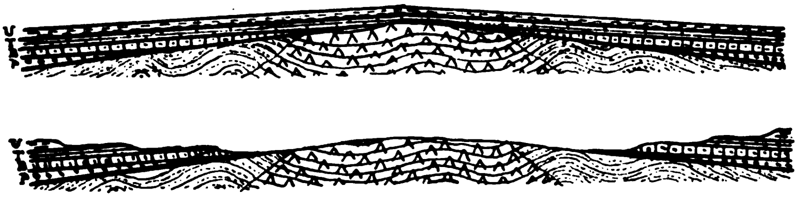

Fig. 6 Diagram to illustrate the condition of the Adirondack region after the Postutica uplift, and the production of terraces by later wear. Vertical scale and dip much exaggerated. P, B, T and U indicate the Potsdam, Beekmantown, Trenton and Utica formations respectively, resting on the Precambric erosion surface. Erosion has not yet cut to sufficient depth to expose the Potsdam, so that its terrace is lacking, and the condition shown is quite like that which is found on the south and west sides of the region today, though in a somewhat modified form on the south. Obviously the depression produced by the opposing slopes of the Precambric floor and the Beekmantown inface, would influence the location of a stream, and the Black river on the west, and certain creeks on the south side of the region, such as Spruce creek in the Little Falls region, are found today occupying precisely that situation.

## Appalachian uplift

The long period of Paleozoic erosion was terminated by uplift of the region, the movement being merely the local manifestation of the widespread movement of uplift and of dislocation which terminated the Paleozoic era in eastern North America. The forces which folded the region to the eastward, affected the Adirondack district but slightly, and the rocks are not folded.

But in the reaction of the region from compression, tension faulting took place on a large scale, and its eastern portion was sliced by the series of meridional faults which cross it. Since these uniformly downthrow to the east, they produced a step-like topography of eastward facing fault scarps, with intervening terrace platforms. In the Champlain region the faults were numerous, and often of large throw, their combined effect being to cause a rapid drop in altitude eastward, and to produce a depression along the Champlain meridian. But at the same time the region still further east was uplifted, mainly by folding and thrust faulting, thus outlining the Champlain valley as a great structural depression, or trough, closely coinciding in position with the previous depression of the Chazy basin. The region directly to the west of this depressed strip was given considerable altitude by the general elevation, and it seems likely that it formed then, as now, the most elevated portion, with a rapid step-like drop to the east, and a gentle and more even slope toward the west. Passing westward, the faults become much fewer in number, and, while they interrupted the prevailing westerly slope with their scarps, the interruption was but local [fig. 7]. This is well illustrated by the Mohawk valley faults, in whose vicinity a strong increase in the westerly component of the dip is always observable, which flattens back to the normal amount with increasing distance from the fault.

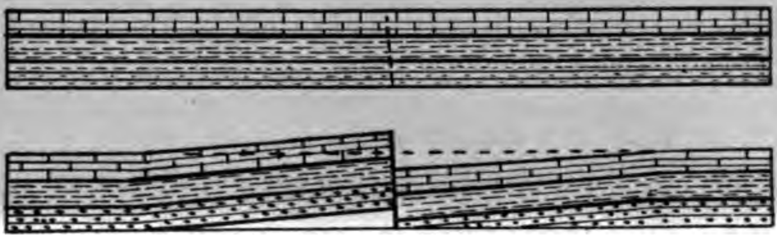

Fig. 7 Diagram of a single normal fault to illustrate the local character of the surface derangement. The rock layers on the upthrow side are given a dip away from, and those on the downthrow side a dip toward the fault plane, but at the ends of the figure the rocks remain as before the faulting.

In some few cases trough faulting was brought about by a pair of faults throwing in opposite directions, and depressing the block between. Between the Little Falls and Dolgeville faults in the Mohawk valley was a block of this sort. Apparently the Paleozoic inlier at Wells, Hamilton co., is preserved in a similar trough. In the Precambric areas to the north, specially in the high Adirondacks, the topography often suggests faulting of this sort. And, as has been shown, cases of this kind are not infrequent between the minor cross faults in the Champlain region.

In addition to the modification in the topography produced by the erection of the fault scarps, the faulting must obviously have affected the drainage. Stream courses would be obstructed by the scarps and the streams turned into parallelism with them, tending to flow along at their bases; and the crushing of the rocks along the fault plane would produce a line of weakness there, which, even after the disappearance of the scarp through wear, would tend to hold the streams there.

### Mesozoic base-leveling

This uplift, which terminated the Paleozoic history of the region, obviously renewed the activity of the erosive processes, and the task of cutting down the region toward the new base level thus given it was begun. Though the evidence is not as clear as could be wished, it points to the region having remained at this newly given level for a long time, long enough to permit the wearing down of the major portion to a comparatively even surface at this new stream grade. In other words, it was worn down to a peneplain, above whose general level certain hills of various altitudes arose, none of which exceeded 1000 feet in elevation, which had resisted somewhat the general wearing tendency, mainly because of advantageous situation. The infacing escarpments of the Paleozoic rocks retreated well away toward the margins of the region, till the weak belts reached grade, after which the escarpments would disappear as the stronger rocks slowly came down to the same level; the fault scarps also disappeared, both sides coming down to the general level; the streams which were flowing parallel to the sides of the region, adjusted to the weak rock belts, would accompany these belts in their movement away from the heart of the region; they would also increase in size by the capture of many of the outflowing streams, leaving only the largest and most advantageously situated of these in their old courses.

It has been shown that the later Mesozoic was a time of widespread base-leveling over much of the eastern United States, notably in the Appalachian region and in southern New England. While subsequent wear has removed much of that old surface, the many fragments that yet remain indicate, by their concordant summit levels and by their level ridge crests, that they are remnants of a former plain; and that it was an erosion plain is shown by the fact that its surface is notably discordant with, or bevels, the rock beds. An extensive erosion plain of the sort can only be produced, on a land surface, at stream grade, and during a protracted period of comparative stability of level.

It has been further shown that this plain has been tipped by subsequent movements, the evidence for which is the present diminution of altitude in certain directions. Thus the uplift of the Cretaceous peneplain of the Appalachians was greatest along a n.n.e.-s.s.w. axis, from which the old surface drops both to the east and to the west. The uplift was also unequal along the axis, being greatest in Virginia and descending both to the north and the south. The peneplain of southern New England, which is supposedly of the same age, is strongly tipped toward the south.

This uplift was followed by another period of comparative stability, during which large progress was made in reducing the surface of these districts to the new base level. This interval was not, however, so protracted as the previous, so that the region was only partially base-leveled. Broad valleys were opened on the weak rock belts, while but little progress was made in the reduction of the resistant rocks, which remain substantially at their previous level, and form today the remnants of the Cretaceous peneplain.[1] The widely opened valley bottoms on the weaker rock belts, with their concordant altitudes when compared with one another, furnish the main evidence for a long stability of the region at this grade.

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[1] Campbell has recently urged the presence of a base level intermediate to these two, from evidence obtained in northern Pennsylvania and southern New York. Geol. Soc. Am. Bul. 14:277-96.

This is no longer the grade of the region, a comparatively recent movement having elevated it, and the streams are now busily engaged in the task of getting their beds down to the new grade and of widening their valleys. They are yet far from being thoroughly adjusted to the new conditions.

### Peneplains

It would seem inherently probable that the Adirondack region participated in the actions outlined, but several causes conspire to make the evidence less clear than in the other districts mentioned. In the southern and western portions of the region, however, the hilltops do, in general, rise to quite concordant levels, which are wholly independent of the rock attitude and structure, and the inference is irresistible that they rise to the level of an old and comparatively even erosion surface, quite likely a product of the same great erosion period which elsewhere developed the Cretaceous peneplain. The probability is hightened when it is seen that the prolongation of this surface southward, above the Mohawk lowland, to the plateau of southern New York, finds it in close correspondence with the upland levels there, as if the two were developments of the same great surface [fig.8]. In both districts, too, this surface is now tipped to the west.

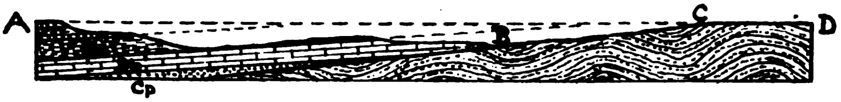


Fig. 8 Somewhat ideal section from north to south across the Mohawk lowland. The Cretaceous peneplain surface extended across the region from A to D. Following the uplift, the intervening region has been worn down, owing to the weak character of the limestones, Sb, and the shales, Su. The harder rocks at A, and from C to D, have resisted wear and remains at the old level. Erosion has not yet reached the horizon of the Potsdam sandstone, Cp. The wearing away of the limestones has bared the underlying Precambric rocks from B to C, exposing the old, Precambric erosion surface, which meets the Cretaceous peneplain at a small angle, which the large vertical exaggeration of the diagram makes altogether too prominent.

Fig. 9 shows the angle drawn to true scale, the upper line representing the CD, and the lower the BC slope.

This old peneplain is best preserved in Hamilton county, though well marked also in Herkimer and St. Lawrence. On the west and south margins of the region it is replaced by another erosion surface of different slope and origin. This has its rise in the very resistant character of the Precambric rocks when compared with the overlying paleozoics, specially in districts where the Potsdam sandstone is thin or is absent, as it is on the west and south. During a cycle of wear, these weaker rocks are stripped away from the underlying Precambric, whose old erosion surface thus reappears, and tends to maintain itself for a time, owing to its extraresistant character [fig. 8]. Thus is produced a considerable strip of Precambric rocks on these two sides of the region, with an even hilltop line, which comes to this level, rather than to that of the Cretaceous peneplain. It, however, slowly rises to meet, and insensibly merges into that.

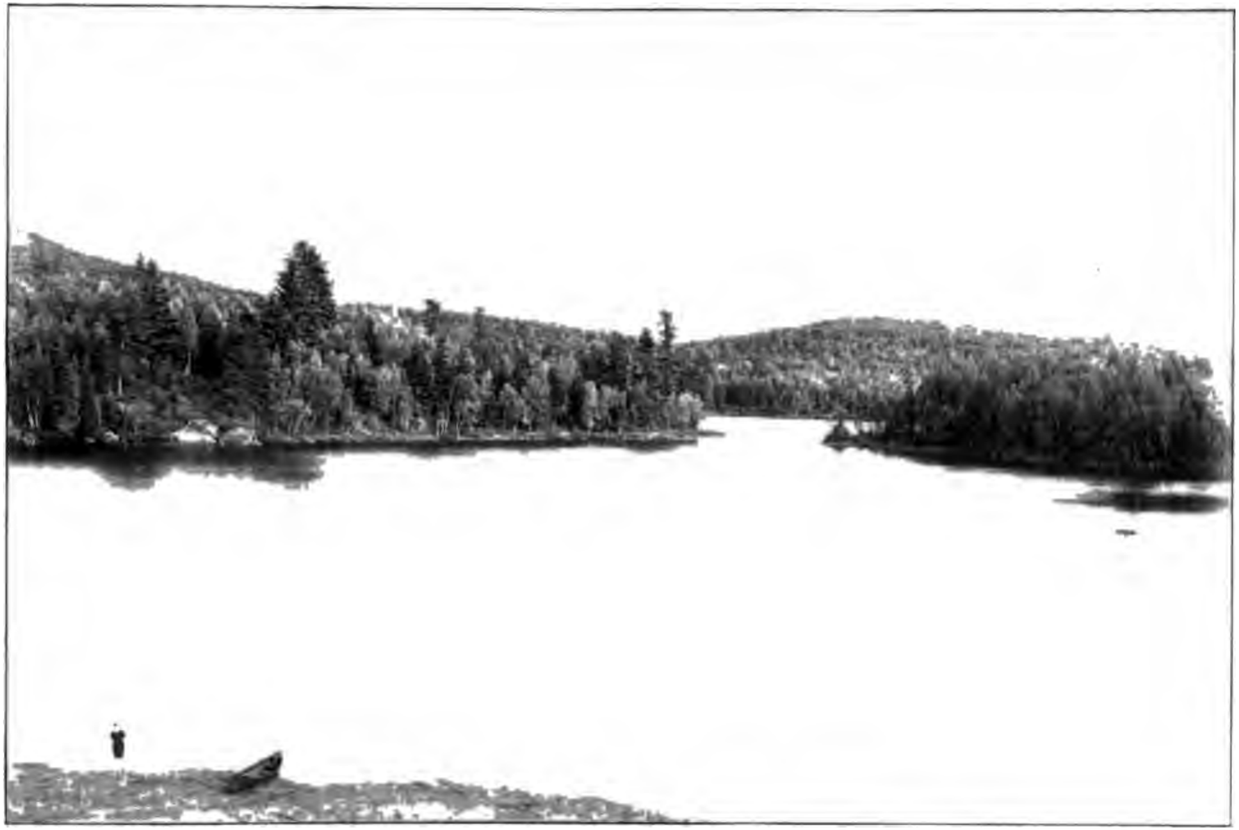
Quite a number of monadnocks, as residual hills which are not worn down to the general peneplain surface are called, exist in the region, their summits reaching a few hundred feet above the general hilltop level. They are not sufficient in number to obscure the general level, though they do somewhat disguise it.

In the same districts the later base level is also indicated by the rather broad valleys and their comparatively uniform levels. It is also observable that, in passing toward the heart of the region, the valleys are deeper cut, in other words, that the vertical interval between the two plains increases, indicating that the Cretaceous peneplain was tipped when elevated, and that the uplift was greatest on the northeast, so that it is now canted considerably to the west and slightly toward the south.

In the eastern Adirondacks the above features can not be satisfactorily made out [pl. 16]. There is little concordance in the summit elevations, so that either the district was not reduced to a Cretaceous peneplain, or else that surface has been dislocated, and given varying altitude, by subsequent movements. Possibly both may be true, and there is some evidence which points to the dislocation having actually taken place.

Recent uplift has affected the entire Adirondack region, in common with a much larger area, and this uplift has been greatest on the northeast. It has amounted to at least 400 feet at the south end of Lake Champlain, and at least 550 feet at the north end, and to 250 feet or more at the east end of Lake Ontario. And these are minimum figures, which must likely be much increased when the entire movement is taken into consideration.

Plate 16



View of the Seward range from the Hiawatha House, on Stony Creek pond. The summit is 8½ miles distant

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It is not certain whether it has ceased or is yet in progress, though the latter is very probable. The streams are working their way down toward the new grade, but have made comparatively slight progress in the task.

### Main axis of elevation

The highest elevations in northern New York occur along a line which, commencing at the national boundary on the north, runs south along the line between Clinton and Franklin counties, till it reaches the district of the high peaks in northwest Essex. Here it offsets sharply to the west, into southern Franklin and northern Hamilton counties, then turns again toward the south and runs down through Hamilton, in this part of its course trending about s. 20° w. instead of nearly due south, as at first.[1] In this change of trend a rude parallelism with the folded rocks to the eastward is to be noted, these also swerving toward the west in passing into New York from the Vermont side. This probably implies an interrelationship between the two, at least in so far as the original location of this main axis is concerned.

Along the Hamilton county portion of this main axis are found the greater number of, and the larger of, the monadnocks which protrude above the Cretaceous base level south of the mid-region. They are so numerous that, were this area alone concerned, the Cretaceous base level would be difficult of recognition. Parallel with the eastern edge of this uplift is a rather deep and wide valley, eastward from which the region is much more dissected, and with considerably lower hill altitudes. The features strongly suggest that the eastern face here is along a line of fault.

The abundance of monadnocks in this district would indicate that, during the period of Cretaceous base leveling, the main divide of the southern district must have been hereabout, just as it is now, since the rocks are not more resistant here than elsewhere. They must therefore owe their preservation to favorable position.

Among the high Adirondacks in Essex and Franklin counties the country is still more rugged and uneven than in Hamilton, so much so that no sign of concordance of level is to be noted among the hill summits.

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[1] On a small scale these features are well shown on the "Map of New York showing the Surface Configuration and Watersheds," recently published by the State Museum.

This main axis of elevation is everywhere so pronounced that it would seem that it could hardly be a feature which had outlasted the long period of Cretaceous base leveling, but that its present prominence must be owing to unequal uplifting at the close of this erosion cycle. The considerable deepening of the valleys in passing toward the heart of the region (the broad valleys cut in the succeeding erosion cycle are the ones here concerned) points clearly to greater uplifting along this line. It also seems likely that, in a region of abundant faults such as this is, such an uplift could not fail to cause additional adjustment along the fault planes. Such movements would give varying altitudes to such portion of the area as had been graded during the long erosion period. That many of the tops of the high Adirondacks are true monadnocks, is highly probable. But that the area is entirely composed of monadnocks, and never had any recognizable development of the Cretaceous peneplain on it, is thought to be exceedingly improbable, much more so than the alternative view here presented. And this is emphasized when the rapid drop in altitude to the Champlain valley is taken into account, both its rapidity and its character suggesting rather recent faulting.

On the prolongation northward of this main axis, the same features are illustrated in the Paleozoic rocks, these being found at the highest altitudes along that line, dropping rapidly eastward down the faults and less rapidly, and more regularly westward. This represents the total amount of tipping which they have received in all the movements of the region, but the present prominence of the axis as a topographic feature seems too great to be accounted for otherwise than by a not too remote date for the last differential movement along it. In addition, certain prominent eastward facing cliffs which appear to be fault scarps, are found in the Potsdam country, just as they are in the Precambrian areas, fault scarps which seem to require actual faulting of comparative recency to account for their presence. The evidence, then, seems to point to actual warping of considerable amount along this axis during the uplift which terminated the Cretaceous erosion cycle, with accompanying downfaulting on the east, giving the fragments of the Cretaceous peneplain varying altitudes and increasing the prominence of the Champlain depression.

### Lake belt

In southern Franklin county, nestling in the angle produced by the offset of the main axis of elevation to the west is an area of broad valleys and low ridges in which lakes are more thickly clustered than in any other part of the region, and for which therefore the name " Lake belt " has been suggested, for the lack of a better term. The valley bottoms have the same levels that they have in adjacent districts, but the ridges are low, commonly only 200 feet or 300 feet high, not by any means attaining the levels that they do in the country east, and considerably lower than the summits in the other direction, though the discrepancy is not so pronounced. The relief is in general insignificant. All the ridge summits are well beneath the horizon of the Cretaceous peneplain level.

No cause for this discrepancy is to be found in the character of the underlying rocks. These are anorthosite and syenite for the most part, the most resistant of all the Adirondack rocks. The rocks of the Lake belt are in no sense weaker than in the areas of higher altitude and greater relief adjoining, are in fact stronger than those to the west.

The belt has many features which indicate that the main preglacial drainage systems passed through it; and this would necessarily tend to lower its general level more rapidly than would be the case at a greater distance from the main drainage lines. But the fact that it is sharply separated from the adjacent districts instead of fading into them, with no change in the rock character, and the abundant rock ridges, all of small altitude and none reaching at all nearly the Cretaceous base level, seem to require a structural cause for their explanation; and it is regarded as a probable dropped fault block, the district to the east having been greatly uplifted as compared with it, that to the west considerably less so. Its own hilltops reach concordant levels, and probably represent the Cretaceous base level, but dropped below its normal altitude.

### Faults as topographic features

As has been stated, it is probable that all fault scarps in the region disappeared by being worn down during the Cretaceous base-leveling period. Such wearing down customarily brings different rock masses into juxtaposition on opposite sides of a fault. Any renewed uplifting of the district then tends to cause a reappearance of a scarp along the fault line, owing to the more rapid wearing away of the weaker of the two rocks. The hight that this scarp may attain will have the difference between the old and the new base levels for its maximum value, and the proportion of this actually attained will, other things being equal, depend on the comparative resistances of the two rocks. If one is very strong and the other very weak, relative prominence may be gained, specially in the near vicinity of drainage lines. The weaker rock may be on either the downthrow or the upthrow side, and, according as the first or the second is the case, the scarp will face in its original, or in the opposite direction, in the latter case giving rise to the anomaly of the downthrow side standing at a higher level than the upthrow. In the cases where there is little or no difference in resistance between the rocks on the two sides, there will be no tendency to cause reappearance of a scarp along the fault line.

Furthermore, except in the case of faults which exactly parallel the strike, the surface rock will vary from time to time on the same side of the fault, and with these changes, now on one side and now on the other, the scarp becomes either less or more pronounced than it was before, as the variation diminishes or increases the difference in resistance of the rocks. In the case of dip faults an irregular topography is sure to be produced along the fault, owing to the more frequent passage from one sort of rock to another.

In general, the faults of northern New York show a weaker rock on the downthrow side and hence tend, on uplift, to reproduce a scarp facing in the direction of the original one.

There are however numerous cases where the resistance is practically uniform on both sides.

In the Mohawk valley region there is no evidence of any recent faulting. The faults are quite typical dip faults, in a district of low dip. Since the Paleozoic rocks there, from the Beekmantown to the Utica, are progressively weaker upward and are all weaker than the underlying Precambric, it necessarily follows that the faults everywhere show weaker rock on the downthrow side, except where the same formation occurs on both. Owing to the recent uplift of the region, the scarps are coming into prominence, specially where they are crossed by streams. In fact, the utter independence of the faults shown by the streams here, is one of the strong arguments against any recent movement along the fault planes, and for such present day prominence as they have being wholly due to the recent uplift of the region.

Along the Mohawk the faults show great cliffs facing eastward, the valley widely opened in the weak shales on the downthrow side, while constricted and gorgelike in the resistant Beekmantown or Precambric rocks on the other. Receding from the river, their prominence is at once lost, and the scarp is either not manifest or but feebly marked. Thus the Little Falls fault, a very noted topographic feature at the river crossing, loses this character entirely a short distance south of it and has no great prominence on the north, when the great difference in resistance of the rocks is taken into consideration. Eventually it passes wholly into Precambric territory and can be no longer traced. While this may be because of the dying out of the fault, there is no evidence that this is the case. If, on the south side, the fault could be followed through the Utica shale belt to where the more resistant overlying rocks appear, these would come in first on the downthrow side, with production of a scarp facing west.

In the Paleozoic limestones along Lake Champlain, which have great thickness, but no marked difference in strength, the fault scarps are in no way conspicuous at the present day; in fact, at low altitudes there are none at all. At higher levels, however, they appear. Thus the Tracy brook fault shows no scarp in that part of its course shown on the map [pl. 12]; notwithstanding it has resistant Potsdam on one side as against weak limestones on the other. Farther southwest, however, where it passes into higher ground, the prominent east face of Rand hill is its scarp. So far as these low altitude faults are concerned, they give no evidence of recent faulting.

Some slight relief has been produced along some of the small cross faults, in cases where the dip is fairly high, 10° or more. These are dip faults; and, since the limestones which they cross have slightly variant resisting power, the more massive beds stand slightly above the surface as ridges, and their lateral shifting by the fault is clearly brought out in the topography. The Black river limestone, and some of the beds of the Crown Point division of the Chazy, are the more prominent ridge makers of this type. This topography is very characteristic of the cross-faulted strip shown in plate 12.

The drainage is not so independent of the faults in this district as it is along the Mohawk. Many of the streams follow the fault lines for considerable distances, Tracy brook and the Little Chazy river, as shown in plate 12, for example.

It is however in this eastern district that the evidence of recent faulting is forthcoming. In the rapid rise in altitude from the Champlain level to the main axis of elevation, which is from 25 miles to 30 miles west from the lake only, are many eastward facing cliffs which resemble fault scarps. The larger number of these show equiresistant rock on both sides. Thus there are apparent faults which are wholly in the Potsdam, having that rock on both sides and with no detectable difference in the resistance, which, notwithstanding, present a prominent easterly cliff. Wear, because of renewed uplift, could by no possibility have brought out this topographic relief; and, in the total absence of evidence of any other mode of origin, a belief that they are fault scarps is compelled, necessitating the further belief that they can be no older than the date of uplift of the Cretaceous base level, and may perhaps be younger.

The majority of the supposed faults are in Precambric rocks. In many cases there seems little difference in resisting capacity of the rocks on the two sides, and in certain cases the rock is identical. There are several cases in which the presence of the scarp can not possibly be owing to differing rock resistance, so that the only element of doubt in the matter concerns the actual existence of the faults. They are very difficult to prove under such circumstances, yet it seems practically certain that they must be there.

### North plain

On the north side of the Adirondacks a gently sloping plain extends from the Precambric boundary down toward the St Lawrence. It is warped upward along the north extension of the main axis of elevation, hence has a northerly pitching axis along this line, with northeast and northwest surface slopes away from it. These are but gentle, some 20 feet to 30 feet to the mile. The underlying rocks are the Potsdam and Beekmantown formations, which have a low, northerly dip. This is however considerably greater than the surface slope, amounting to from 100 feet to 200 feet to the mile, so that the rock layers are beveled by the plain surface, progressively higher beds being exposed going north.

The general surface has received a comparatively smooth veneer of glacial deposits, supplemented by the deposits of running and static waters during and after the ice retreat. Low moraines constitute the principal present irregularities. There is no Beekmantown inface, for example, though this may be lacking because of being planed down by the ice sheet. Rock outcrops are so scarce in the region, however, that there is no opportunity to determine whether this is the case, or whether the inface has been buried beneath the drift. The old stream valleys have been filled up, and the streams have since somewhat reexcavated them though, since they have not accurately followed the old channels, they have met rock at small depth in spots where they have missed the track, and this has greatly retarded the reexcavating process. The plain retains approximately its preglacial slope, but its irregularities have disappeared through blanketing. It lies below the Cretaceous peneplain level, having been worn down below that in the Postcretaceous erosion cycle.

The Precambric boundary presents quite different characters on the north from those seen at the south. It is much more sinuous and much more abrupt. There is no Potsdam inface, and the Precambric rocks are apt to tower somewhat abruptly from 25 feet to 100 feet or more above the Potsdam level. Between these outlying ridges embayments run, carrying the slope of the plain in between the ridges, and in many of these embayments the Potsdam is found, lying between the gneisses of the adjoining ridges. Faulting has undoubtedly played some part, perhaps a major part, in the production of these features, but it does seem quite clear, nevertheless, that the shore had a steeper slope than on the south, and that the surface was much less even.

### Northern hills and valleys

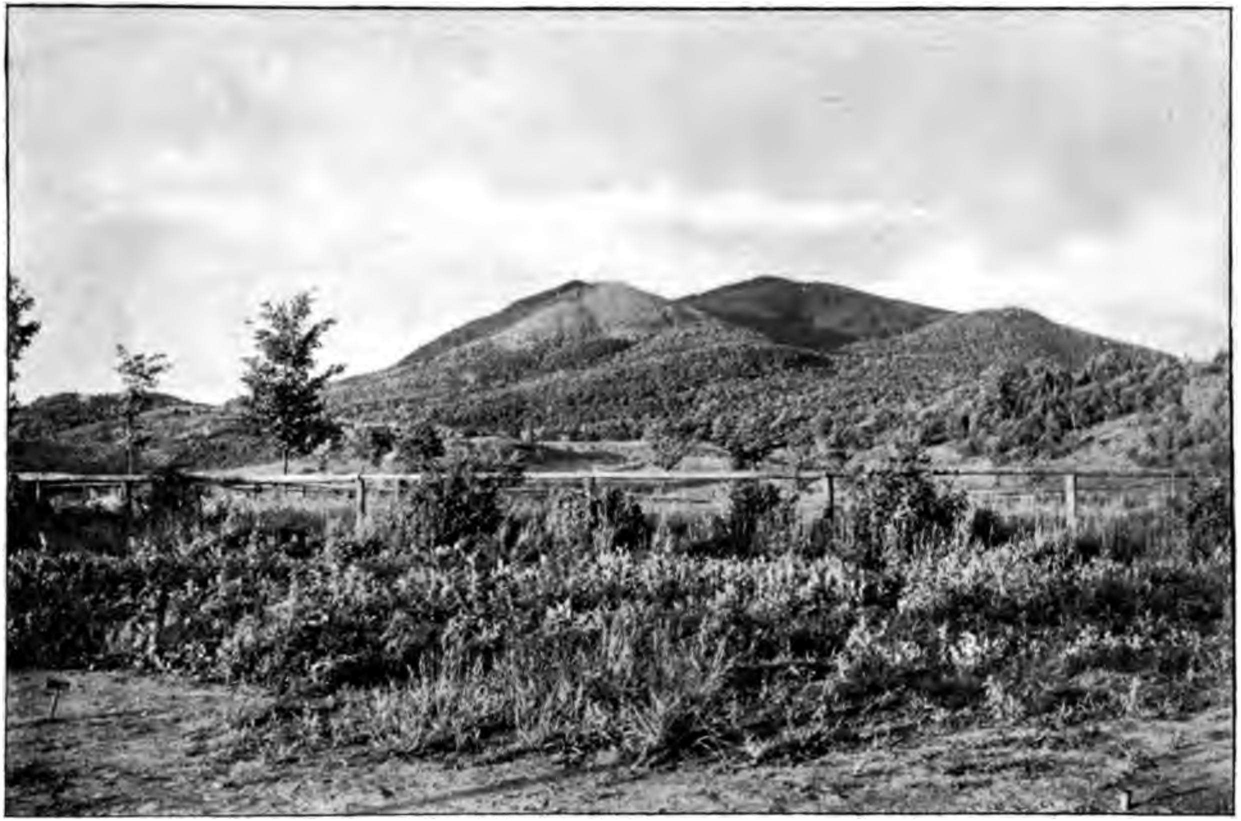
The ridges and valleys of a large part of the Adirondack region show a general north-south to northeast-southwest trend, this being more prominently the case in the eastern half of the region. The precise cause for this general trend is not clear. The larger faults have this direction and are undoubtedly influential factors in the topographic control; the strike, both of the foliation and of the Grenville bedding, has often the same direction, and has no doubt its share in determining the topographic alinement; one main joint set has the same trend and may also be a factor; finally, the ice sheet moved over the district with a south to southwest direction; and, though the direction of the basal currents was mainly controlled by the existing topography rather than the topographic trend a result of the ice direction, yet some share in the general shaping of the region must be allotted to it. It seems likely that all these factors have combined in the production of the present trend; but it is as yet wellnigh impossible to determine definitely their relative importance. The frequent independence of this trend shown by the strike naturally suggests that it is of less importance than the others. The prominence of other joint sets, in addition to those trending with the ridges, indicates that they were not the controlling factor, but that the direction was determined by something else, and, once determined, this joint set becomes of greater importance than the others. By a process of elimination, the faults seem to remain the most probable controlling factors in the original determination of the trend.

The present valleys were excavated below the Cretaceous base level in the Postcretaceous erosion cycle. The comparative weakness of the Grenville rocks determined valley location where they were present in any force, and a respectable number of the valleys of the region are of this origin. They are most numerous in western Essex and St Lawrence counties, being comparatively infrequent elsewhere. There are also many valleys in which one or more small patches of Grenville rocks may be found, surrounded by others of a different nature; and in these it is quite possible that the Grenville patches are merely the final remnants of much larger Grenville masses, which determined the location of the valley and have disappeared in its formation. But even where a very large allowance is made for possible instances of this sort, it yet remains true that Grenville rocks make small show in most of the region, and that the larger number of the valleys can not have been located on Grenville belts; are developed in fact in rocks identical in kind with those which make up the neighboring ridges. To account for these, it seems necessary to invoke some structural cause, and such may be found in belts of rubble rock along the faults, in belts of excessive jointing and slip faulting, and in the location of streams by the original fault scarps; also in the production of actual fault valleys (*Graben*). These are truer in direction than the Grenville belts and best explain the prevalent trend.

The larger number of the ridges of the northern Adirondacks show a certain type of configuration which calls for explanation. They have a long, gentle, even incline to the northeast, a summit well toward the south end, and a steep back slope, often in part a perpendicular cliff and in general steepest at the top. These features are seen most typically on the smaller ridges, but the larger ridge masses show a tendency to the same type. At the backs of these an amphitheater is apt to be developed, sometimes of the typical cirque shape, and always strongly suggestive of glacial action [pl. 17]. Precipitous rock cliffs are always a feature on this side, while wholly absent on the gentle north slopes, on which rock outcrops of any sort are infrequent. The writer has often searched the north slope of such a ridge without finding a single satisfactory outcrop, while they are certain to be abundantly found when the summit and back slope are reached.

In the high Adirondacks, in the anorthosite region, these features are not found, the cirques excepted, and these are found along the flanks of the ridges as well as at the back. Stony Creek mountain [pl. 17] is an anorthosite mountain and on the edge of the high peak district, but it exhibits the general features just noted very imperfectly. They are better shown in many of the syenite peaks and in the main seem confined to the ridges of foliated rocks. The syenites always show more foliation than the anorthosites. Yet the writer has been unable to discover any connection between the strike and pitch of the foliation and the trend and pitch of the ridges; and, if any such does exist, it is obscure, though the facts noted above suggest some relationship.

That much of the shaping of the ridges has been done by glacial action seems clear. The northern hills are the ones mainly concerned, those so situated that they would feel the full force of the onset of the southwestwardly moving ice, after its advance, unimpeded by any obstacles, over the plain to the north. It must have impinged heavily on the north slopes of the hills, and the basal currents moving up the intervening valleys must have closely hugged the ridge sides. There would be at first a tendency to wear down all projections, and later to fill up depressions and blanket the slopes with till and moraine stuff. The lee side of the ridge, however, would not be closely enfolded by the ice, so that little smoothing would be done there. In the waning stages of the ice sheet a *bergschrund,* or *crevasse* between the ice and the back slope of the mountain, would be formed, in which a daily variation of the temperature from thawing to freezing would take place during a large part of the year, which would cause a rapid scaling off of the rock along the joints, producing rough, steep cliffs. During the wan-



Stony Creek mountain from Axton, looking east northeast. Distance to the summit 3¼ miles. The mountain is not of the typical ridge type though it approximates it. It broadens out on the southwest and sends out two spurs with a deep amphitheater between

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ing of the ice sheet or at a somewhat later period, small local glaciers appeared high up on the mountain sides which, grinding away at their beds, with this *bergschrund* action at work on their sides, excavated the amphitheaters. But, while the ridges have thus been ice-sculptured, it is wholly unlikely that they were produced by glacial action. The ice found the ridges and valleys when it entered the region and merely left them somewhat modified. Some of the back slope cliffs strongly suggest fault scarps. One for example, suggests a fault across the ridge crest which has dropped its southern portion and produce the cliff and terrace outline. There is but a single sort of rock in that ridge, a resistant quartz syenite gneiss, so that the topography can not be accounted for by varying rock resistance. The sudden manner in which many of the ridges are chopped off at the south is very indicative of faulting. If faults are present, they are cross faults, since the main ones parallel the ridges. It is an exceedingly difficult matter to determine just how large a share the faults have had in determining the present situation and character of the ridges.

### Streams

The working out of the varied history of the Adirondack streams is a matter of the future. No one has yet had opportunity to give the problem the thorough and exhaustive study that it requires. Furthermore, it is a difficult problem, owing to the great age of the land area, the several oscillations of level which it has experienced, the difficulty of determining the controlling factors in the Precambric district, and the many changes produced in the drainage by the action of the ice sheet.[1]

The general drainage of the present day runs radially outward from the main axis of elevation, and in part these streams seem the lineal descendants of the original consequent streams. Since a blanket of Paleozoic sediments probably covered the entire region, these original streams soon became superimposed streams, and showed no adjustment to the Precambric rocks which they uncovered in their beds during the stripping away of the Paleozoic cover. The present valleys are largely adjusted to these rocks, and this adjustment has been brought about by the successive uplifts of the region, each new cycle of wear tending to make it more perfect. The adjustment is in part on the weak rock belts and in larger part on the weak rock structures.

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[1] No attempt will be made in this paper to discuss the Pleistocene history of the region, since little connected work has hitherto been done on it and because Professor Woodworth is now at work on the problem. Much information may be gained from papers by Brigham and Ogilvie. Geol Soc. Am. Bul. 9:183–210; Jour. Geol. 10:397–412.

The Champlain valley has been shown to be a structural one, and as such to be the inevitable site of a drainage system. The subsequent origin of the Mohawk and Black rivers has also been indicated and had been previously emphasized by Brigham and others. The St Lawrence valley has also the character of a subsequent valley, as was first pointed out by Westgate; but, as it was the site of an old Paleozoic trough of depression and deposit, which seems to have been deepened by subsequent movements, this would appear to have had some share in determining its position. With successive uplifts of the region, the Mohawk and Black river valleys move laterally outward. This is not the case with the Champlain valley.

The outflowing Adirondack streams of the present are thus all tributary to streams which parallel the sides of the region. Those outflowing to the west and south are but the remnants of the consequent streams which continued on in those directions before the development of the Mohawk and Black river valleys, as Brigham pointed out. They rise near the main axis of elevation and flow in valleys cut in its gentle westerly slopes. Beginning at the southwest with West Canada creek, apparently only recently transferred to the Mohawk drainage from the Black, all the westerly streams, the Moose, Beaver, Oswegatchie, Grasse, Raquette, St Regis, Deer, Salmon and Chateaugay rivers, have this general character. All have been affected and modified by the ice sheet; but these modifications are local, and otherwise these streams rise near the main axis of the region and course down its westerly slopes, to the southwest, the west and the northwest. The abrupt deflection of the Oswegatchie, Grasse, Raquette and St Regis from their normal northwest courses to a northeast direction, so that they flow parallel to the St Lawrence for many miles before emptying into it, is an interesting feature which has not yet been explained, though probably not difficult of explanation when the ground is thoroughly studied. The Oswegatchie emerges on the Precambric rocks of the Frontenac axis, and its behavior is obviously controlled by the topography, as it takes a subsequent course parallel to the ridges. But the other three streams make their bend on the northern Paleozoic plain, and the cause can hardly be a structural one. It must be sought in the Pleistocene features of the region, either this portion of the plain having a general slope to the northeast, owing to unevenness of glacial deposits, or else morainic or beach ridges being the deflecting cause.

The streams of the eastern Adirondacks mostly rise in the neighborhood of the high peaks. The Hudson and Ausable have their head waters in the high passes of that district. The Schroon and Sacandaga head in the ridges east of the main axis. The Saranac, on the north, heads in the Lake belt and is the only one of the principal streams to cross the main axis of elevation, both of its branches so doing. That portion of it which lies west of the axis is separated from the present Raquette and St Regis systems by the most trivial of glacial divides, and undoubtedly drained to the westward formerly. The date of capture by the Saranac is not known. The easterly flowing Adirondack streams have an advantage over those flowing west, owing to their steeper slope, and tend therefore to extend their head waters westward, causing the divide to migrate in that direction, away from the main axis. That the capture occurred in preglacial times seems very probable.

Farther south, in eastern Hamilton county, the main axis is crossed by two broad valleys, one running east from Long lake and the other from Raquette lake. These are however located on weak Grenville belts, on which it was easy for streams, flowing eastward from the main axis, to push their divides westward across the axis. The modern divides in that region seem of glacial origin, and our present knowledge does not suffice to determine how much of the drainage west of the axis had been captured in preglacial times. That the drainage of the Long lake and Raquette lake valleys went out to the northwest in preglacial times is exceedingly improbable, and it may well have gone eastward to the Hudson.

The fact that the main axis of the region is to so large an extent the modern watershed, is the strongest of the arguments for its prominence having been given to it in comparatively recent times.

The northeastern streams, the Ausable, Saranac, Big Chazy and English rivers, flow in general northeast courses away from the main axis. Faults control them somewhat, and here the direction of the main faults is also that of the consequent stream flow. The upper Ausable and Saranac are, in part at least, controlled by faults. In their lower courses all cut across the strike of the Paleozoic rocks.

It is in the southeastern part of the region that the streams show the most marked adaptation to the structures, as was noted by Brigham on the publication of the first topographic sheets of the region.[1] The main streams here have n. to n.n.e. or s. to s.s.w. courses and receive their main tributaries from the west. Such Grenville belts as occur trend with the tributaries rather than with the main streams, and the determining cause of location is obviously a structural one. Ogilvie argues that the faulting was accompanied by block tilting toward the east, that the main drainage lines are located along the faults, and that the tributaries on opposite sides work against an abrupt fault cliff on the one hand or down a gently tilted slope on the other; that those down the slope have a conspicuous advantage and have extended their courses much farther back than those flowing in the opposite direction.[2] That the main streams follow the fault lines, the writer quite agrees. And, if the faults downthrow to the west, the rest necessarily follows. But, if they are normal faults downthrowing to the east, as most of the proved faults of northern New York are, it is more likely that the surface tilting would be to the west. It would also seem that the streams down the fault scarp would have an advantage over those down the back slope, because of their much steeper grades, and that originally the main tributaries would be westerly flowing streams down the back slopes, but that the streams down the scarp would lengthen at the expense of the others, pushing the divides westward. If now the main streams are at successively lower levels going eastward because of step faulting, these easterly tributaries would have that additional great advantage over those flowing west, and would not only tend to extend themselves at the expense of the westerly streams, but also to work back to, and to tap and lead off portions of the larger streams to the westward. Inspection of the maps shows many such apparent captures of the main streams by the easterly tributaries. If the writer be correct in his belief that these are the main structural features of the region, the assumption of the abnormal easterly tilting of the fault blocks seems unnecessary.

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[1] Am. Geol. 1898. 21:219.

[2] Jour. Geol. 10:408.

The great and abnormal bends to the northeast which are made by both the Hudson and the Sacandaga, some 15 miles to 25 miles north of the Mohawk line, would seem to be wholly modern and owing to glacial action. As a result of this swerve, no stream of respectable size enters the Mohawk eastward from East Canada creek, the drainage all turning east to the Hudson, while the divide between the streams flowing south to the Mohawk and those passing east into the Hudson, parallels the Mohawk and is distant from it only 15 to 18 miles. These features are excellently shown on the new, small scale topographic map of the State and strongly suggest a morainic divide, and that the Sacandaga formerly came down to the Mohawk in the Amsterdam region. The modern stream which flows northeastward from Gloversville and empties into the Sacandaga at the big bend, would seem to occupy this valley. Obviously a considerable shifting of divides must take place here in the near future, the present arrangement being highly unstable.

Chamberlin long since urged that the preglacial divide or col in the Mohawk lowland, between the drainage east to the Hudson and that west to the Ontario valley, was at Little Falls, the location being determined by the Precambric rock mass there, brought up by the Little Falls fault.[1] Brigham has urged that West Canada creek was, at that time, tributary to the west flowing drainage, which he names the Rome river, coming into the valley at Oriskany by way of Holland Patent.[2] While the writer quite coincides with this view, he is also disposed to the belief that this route is comparatively modern, representing a capture of the upper part of the Black river drainage by a tributary of the Rome river. Black creek, the main tributary of West Canada creek, flows along the Precambric boundary in a northwesterly course, and seems unquestionably to represent the former upper portion of the Black river, as is shown in an excellent manner on the new topographic map. There is heavy drift filling between, but no sign of any rocky col, and the tributaries from the northeast show perfect parallelism with the Black river head waters coming down from the same direction.

**Youthful character of the present drainage.** During the withdrawal of the Laurentide glacier from the northern Adirondacks, the preglacial stream courses cut in the valley base level were completely filled with glacial deposits, while at the same time the irregular floor of the valley base itself was covered and evened by them. After the departure of the ice, the courses of the streams were determined by the position and slope of these deposits, and some discrepancy between their present and former courses was produced. The slopes of the glacial deposits in the valleys were gentle, lakes occupied the hollows more numerously than at present, and the new streams obtained steep grades only after they emerged from the hills on the slopes leading down to the Champlain and St Lawrence valleys. Their profile was convex rather than concave, and so it remains to a large extent today, while in mature stream valleys the profile is concave.

The main streams of the region are of respectable size, and their slope is steep. The Saranac river from Lower Saranac lake to Lake Champlain, in a course of about 75 miles by the river, has a fall of over 1400 feet, nearly 20 feet to the mile. The Ausable, from Lake Placid down, has a greater fall than the Saranac by 300 feet in a somewhat shorter course. The Raquette and St Regis have a slope somewhat less, but yet over 15 feet to the mile. These are considerable slopes for streams of the size, and excavation of their beds is going on at a fairly rapid rate. The drift deposits were rapidly cut into and the top of the rock knolls of the valley floors, which lay underneath the stream where it was not over its old channel, were uncovered. The rapid downcutting would be at once checked at these points, but on the downstream side of the obstruction the cutting in the drift would continue actively, causing a fall or rapid at the point, which would commence to saw back a gorge into the rock obstruction. Upstream, however, the drift could not be cut out to a greater depth than the level of the obstructing rock ledge, though it would be quickly worn down to that level and a wide valley rapidly eaten out in the yielding drift materials. In this way the stream courses would be divided into sections of slight declivity and of mature character, commencing and terminating with rapids over rock ridges.

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[1] U. S. Geol. Sur. 3d An. Rep't, p.362.

[2] Geol. Soc. Am. Bul. 9 :191.

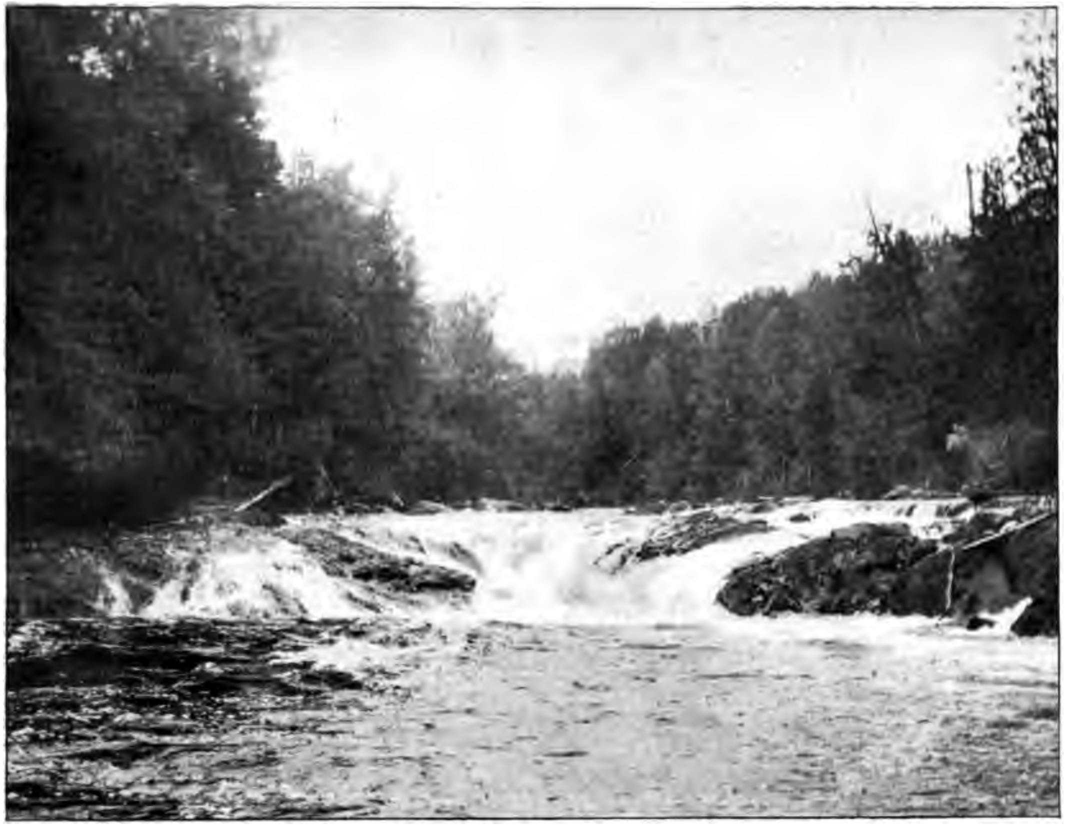
Most of the Adirondack streams illustrate well these general principles. Their head waters are in chains of lakes, and their courses below consist of reaches, or stillwaters or levels as they are locally called, interrupted by rapids and gorges. The Saranac serves well as a type. It rises in Lake Clear, passes thence into Upper Saranac lake, Round lake and Lower Saranac lake and leaves the latter near the middle of its eastern side in a wholly postglacial channel. At the rapids at Saranac village the river is only 6 miles distant from Lake Clear in an air line, while by water it is from 25 to 30 miles distant. Below the village the first considerable rapid is at Franklin Falls some 20 miles away, where the river falls 40 feet within the space of half a mile. In the 20 miles above it has fallen less than 100 feet, or only about 4 feet a mile. Below the falls it flows through a gorge half a mile long, with walls 100 feet high, which apparently marks the channel of a small preglacial stream, or else a low divide between two small streams. Below the gorge a wide marshy valley opens out, through which the river flows in a beautiful series of meanders. Heavy drift filling turns it aside over the rock ledge in the gap at Union Falls. At Clayburg, 8 miles below, it meets the north branch and turns abruptly into the larger valley occupied by that smaller stream. Turned aside, probably by depth of drift, the river encounters the ponderous rock ridge at the High falls, in which it has cut a very considerable gorge, which appears wholly postglacial. The position of the preglacial channel hereabout has not been ascertained, a fairly continuous line of rock outcrops occurring to the northward and many appearing to the south of the present channel.

Beyond the High falls the valley is again broad and filled with drift. At Cadyville the river is once more out of its old channel, and has cut quite a gorge in the Potsdam sandstone at that point. From Cadyville to the mouth of the river at Plattsburg the fall is 400 feet and the distance 10 miles, giving a rate double the average fall of the stream, yet the bottom of the drift filling is nowhere reached save at the pulp mill, 2 miles above Plattsburg, where a long but not deep cut through the Beekmantown limestones has been made, and at Plattsburg itself.

Two thirds of the 1400 foot fall of the Saranac is made in the lower one third of its course, giving a highly convex profile. The Ausable follows its old valley more closely, crosses the 1000 foot contour much farther from its mouth and has a profile not notably convex. The northwesterly streams all have convex profiles also.

The Raquette drainage shows some interesting and puzzling features. The reach from Raquette falls to Piercefield is much the longest shown by any Adirondack stream. In all this distance the valley is wide and mature, the river flows in great loops which reach the rock walls but seldom, cut-off oxbows are exceedingly common, and the valley floor is mainly one great swamp. The valley narrows to Raquette falls, where there is a fall of 70 to 80 feet in a gorge ¾ of a mile long, in which the water is rapid throughout, but with two principal falls [pl. 18]. There is an impassable rock barrier here, with no opportunity for a buried channel, so that there could have been no preglacial drainage line; rather, there was here a col between small streams flowing both ways from the obstruction. Above Raquette falls the valley widens southward, as it should on this supposition. It was occupied by a small preglacial, south flowing stream, which either

Plate [illegible]



Main fall in the gorge at Raquette Falls. The rock is the border, gabbroid phase of the anorthosite

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turned eastward into the valley running east from Long Lake village, or else westward and out through Raquette lake valley and the Moose river. The former is the more likely, though the drainage must originally have been westward, and this eastward course represents a later reversal of direction, since it crosses the main axis.

The stream flowing north from Raquette falls was a tributary to the main drainage line running westward from Axton, in the present Raquette valley, with the Ampersand creek valley as its eastward extension. Not unlikely there was a corresponding tributary from the north, occupying the present valley of Upper Saranac lake, though it is not yet certain whether that stream drained to the south into the Raquette or to the north into the St Regis. The general drainage arrangement in this district is of the trellis pattern, it being a northern extension of the southeastern area, where that type prevails, though it seems more disturbed by glacial action than that.

## Lakes

Lakes are of frequent occurrence throughout the Adirondack region. They most abound in what has been called the lake belt, but they are found in great number throughout the central and western portions of the region. East of the main axis, they occur in much smaller number, though by no means infrequent. There are literally hundreds of them. They range in size from fairly large bodies of water, several miles long and a mile or two in width, down to the most insignificant of ponds. The larger ones are usually long and narrow and occupy the full width of the valley in which they lie. These are mostly confined to the central and eastern portions of the district, those portions whose main valleys have received a north to northeast alinement from the faults, and the lakes occupy portions of the main valleys, their trend coinciding with that of the valley direction. Upper and Lower Saranac, Big and Little Tupper, Indian, Schroon and Long lakes are the more prominent members of this group. Placid, Cranberry and Raquette lakes are of a somewhat different type, in that they seem to occupy portions of more than one valley, the valleys being closely adjacent and the divides low, and their greater breadth being thus accounted for. There are rock islands, in fact, in all of these large lakes and often in considerable number. Lower Saranac lake is full of them, alined so as to suggest the drowning of adjacent small valleys. The chain of islands in the center of Big Tupper lake suggests the same thing.

The smaller lakes are of a great variety of types. Some of them are in narrow and some in wide valleys; some are nearly or wholly rock bound, while others show little or no rock along their shores; some are in deep, steep sided valleys, while others have low, sloping shores; some are strung out in chains along a single valley, though the majority are single.

The causes for the existence of these lakes are as various as the causes which produce hollows on the surface of a region recently invaded by an ice sheet, such a surface having a combination topography due to both destructive and constructive processes. It is held by many observers that locally glaciers may excavate shallow rock basins, and Ogilvie has argued that lake basins of that type are abundant in Hamilton county.[1] Quite likely also such exist in the north portion of the region, though they certainly are not the common type there, the majority occupying depressions in the drift surface in the wider valleys. Such a lake as that shown in plate 16, for example, is a good representative of the usual type. This lake, Stony Creek pond, shows occasional rock ledges on its east shores, but it lies on the east edge of a great sand terrace which extends from the south end of Upper Saranac lake to Axton on the Raquette, the sand undoubtedly overlying till at no great depth, so that we are dealing with a small preglacial valley now badly clogged with drift. The level of the pond is so nearly that of the modern Raquette at Axton that its outlet has no cutting power.

The larger lakes are mostly up near the main divide of the region; and, though they occupy portions of preglacial valleys, these were toward the head waters of the preglacial streams and were therefore of no great width. Their south to southwest trend closely conforms to the direction of movement of the ice sheet, which must thus have thoroughly scoured them, and it may well be that some, or all, of them have somewhat of the rock basin character, though no proof of this is yet at hand, so far as the writer is aware. Many of them are demonstrably held up by morainic dams; but that might be true and yet the lake be somewhat of the rock basin type. Many have highly irregular shore lines, owing to the drowning of the mouths of the small, tributary valleys, and in general there are no features of these which at all suggest the hanging valley type; they rather strongly suggest the contrary. In the comparatively small number of instances of what may prove to be hanging valleys, of which Bog river falls at the upper end of Big Tupper lake is a good example, it is far from certain that the streams are not locally out of their preglacial channels near their mouths, and that the fall is not thus to be accounted for. There are however some features of these larger lakes that do suggest some deepening of their basins by the ice sheet, but the data are too fragmentary to justify a present discussion.

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[1] *Op. cit.*, p.411.

Many of the Adirondack lakes are being shallowed quite rapidly by the considerable amount of sediment washed into them by the streams. In the few thousand years that have passed since the ice vanished from the region quite a number of lakes, both large and small, have been completely filled in this way and converted into vleis. And at the present day many examples showing all stages of the process are to be found.[1] Some are converted into comparatively dry meadows, some are wet and boggy, some have still a foot or so of water, but with a growth of vegetation over the entire surface, others have still some clear water in the center, others only a fringe of rushes and water lilies along their margins, still others are very shallow throughout but with only a beginning of vegetable growth, and this well out in the pond as well as near shore, yet others are still comparatively deep. Almost without exception the topographic sheets of the region show examples, and often numerously. On the Saranac lake quadrangle, for example, a filled lake basin, 4 miles long, is seen in the north center of the sheet, its flat surface being utilized by the Chateaugay Railroad for a roadbed, while Sumner creek works its sluggish way through it in a beautifully typical, meandering course; Ray brook may be seen flowing through a small, filled pond on the southeastern part of the map; on the extreme southwest, the marsh which fills the former east portion of Middle Saranac, locally called Round lake, is well shown; on the northwest, the Osgood river flows into the pond of the same name through a swamp which marks its filled northern extension; the south end of Colby pond is converted into a marsh; on the other hand, Lower Saranac and Rainbow lakes, Mackenzie, Moose and Lonesome ponds are not yet sufficiently shallowed anywhere to show more than a mere beginning of marsh vegetation. On the Blue mountain quadrangle there are fewer examples, but Polliwog pond, on the extreme north and just east of Long lake, is marsh except for the small lagoon yet remaining in the center; Rock lake is marsh at the west; and the Grassy ponds, on the east near the Chain lakes, have names which imply their condition. These are but two examples selected at random from among the 20 Adirondack sheets so far published. Any of the remainder would have served equally well. Those lakes originally the shallowest, and those into which sediment is being, or has been washed the most rapidly, are of course those in the most advanced stage.

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[1] *See* Smyth, C. H. jr. Lake Filling in the Adirondack Region. Am. Geol. 11:85–90.

According to Ries, while lake filling is going on at many points in the Adirondack region, yet very little true peat seems to have been formed, for the streams flowing into the lakes often carry too much sediment, and plants other than mosses usually fill up the lake.[1]

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[1] N. Y. State Geol. 21st An. Rep't. 1903. p.r85.

# INDEX

The superior figures tell the exact place on the page in ninths, e. g. $331^3$ means page 331, beginning in the third ninth of the page, i. e. about one third of the way down.

**Adamellite**, analyses, $339^7$.
Adams, F. D., cited, $305^9$, $343^4$, $345^1$.
Adirondack eruptives, general characters, $338^6$-$40^7$.
Akerite, $340^1$.
Albite, $313^7$, $319^5$, $334^4$, $335^7$, $336^3$, $337^3$, $339^9$, $348^6$, $352^4$, $352^8$.
Allanite, $313^6$.
Alnoite, $398^4$.
Ami, cited, $383^5$.
Amphibolites, $296^5$, $301^1$, $301^6$, $330^7$.
Analcite, $396^7$.
Analyses, $331^3$-$38^5$, $350^5$-$51^4$, $397^6$, $398^6$-$99^4$.
Andesin, $320^3$, $321^4$, $328^6$, $349^2$, $396^2$.
Anorthite, $304^4$, $328^6$, $334^4$, $335^7$, $336^3$, $337^3$.
Anorthoclase, $352^7$.
Anorthosite, $275^8$, $303^3$-$8^6$, $338^7$, $340^8$, $341^2$; analyses, $332^6$, $334^7$; differentiation, $305^9$-$7^6$; relation to syenite, $318^9$-$22^6$; surrounding rocks, $307^7$-$8^6$; texture, $305^3$; Whiteface type of, $310^6$-$12^1$.
Anorthosite gabbros, $306^7$, $308^9$, $310^5$, $310^8$, $320^3$; analyses, $332^7$, $334^5$.
Anorthosite outliers, $308^9$-$10^5$.
Apatite, $295^5$, $304^5$, $309^5$, $309^8$, $309^9$, $311^6$, $313^6$, $313^8$, $319^4$, $326^8$, $329^6$, $335^5$, $348^6$, $351^7$, $352^4$, $352^5$, $352^7$, $398^3$.
Appalachian uplift, $421^8$-$23^4$.
Asaphus canalis, $366^9$.
Augite, $300^7$, $304^5$, $305^1$, $309^7$, $309^9$, $310^1$, $311^5$, $313^5$, $313^6$, $313^8$, $313^9$, $319^4$, $328^3$, $328^7$, $329^3$, $329^4$, $334^4$, $335^8$, $336^4$, $337^3$, $337^5$, $349^2$, $349^4$, $349^6$, $349^9$, $350^4$, $351^6$, $351^8$, $351^9$, $396^2$, $396^7$.
Augite syenite, $340^1$; analyses, $333^1$, $339^7$, $353^5$.
Ausable river, $439^5$, $440^4$, $442^9$.

**Banatite**, analyses, $339^7$.
Basic dikes, $396^2$.
Batholites, $402^6$.
Beekmantown (Calciferous) formation, $281^2$-$82^7$, $360^7$-$69^3$, $388^6$-$89^9$.
Big Chazy river, $440^4$.
Biotite, $296^5$, $300^3$, $300^8$, $304^6$, $309^8$, $313^6$, $315^2$, $318^6$, $319^4$, $323^6$, $328^9$, $348^4$, $348^6$, $349^7$, $351^7$, $352^4$, $352^6$, $396^2$, $396^7$, $398^2$.
Birdseye limestone, *see* Lowville (Birdseye) limestone.
Black creek, $442^3$.
Black river, $438^3$.
Black river formation, $283^9$-$84^6$, $371^5$-$73^4$, $391^8$-$93^2$; thickness, $376^5$.
Bolboporites americanus, $366^4$.
Bostonites, $395^5$-$96^1$.
Brainard, cited, $361^2$, $365^4$, $374^8$, $376^4$, $383^4$.
Brigham, cited, $437^9$, $438^4$, $438^7$, $440^6$, $442^2$.
Brögger, cited, $340^9$.
Bronzite, $305^2$, $313^5$, $337^5$, $349^5$.
Bucania *sp.*, $367^4$.
Bytownite, $304^4$.

**Calciferous** formation, *see* Beekmantown (Calciferous) formation.
Calcite, $348^7$, $395^8$.
Calymmene multicosta, $367^8$.
Cambric sandstone, *see* Potsdam (Cambric) sandstone.
Camerella (?) costata, $365^8$.
Campbell, cited, $424^9$.

Camptonites, $396^2$.
Cassin formation, $362^7$-$64^9$.
Cenozoic history, $290^7$-$92^8$.
Chalcopyrite, $304^6$.
Chamberlin, cited, $441^9$.
Champlain dikes, age of, $396^9$-$97^5$.
Champlain valley, $438^3$.
Chazy formation, $282^7$-$83^4$, $365^1$, $389^9$-$90^6$.
Cheirurus polydorus, $366^9$.
Chemical analyses, $331^3$-$38^8$, $350^8$-$51^4$, $397^6$, $398^9$-$99^4$.
Chlorite, $304^7$, $348^7$, $351^9$, $352^7$.
Cumings, cited, $377^6$, $383^7$.
Cushing, H. P., cited, $374^9$.

**Dannemora** formation, $303^1$.
Darton, cited, $397^8$, $410^2$.
Diabase, $278^9$, $348^9$-$54^2$, $355^7$, $356^2$; analyses, $351^1$, $353^5$.
Diabase dikes, $345^7$, $346^6$, $348^9$-$54^2$; faulting, $403^6$.
Diana syenite belt, $315^4$.
Dikes, $278^7$, $345^6$; black, $279^2$; diabase, $345^7$, $346^6$, $348^9$-$54^2$, $403^6$; red, $279^1$; syenite, $346^7$. *See also* Basic dikes; Champlain dikes.
Drainage, $437^6$-$45^5$; present, youthful character of, $442^5$-$45^5$.

**Eakle**, cited, $351^9$.
Elevation, main axis of, $427^2$-$29^3$.
Emmons, cited, $369^9$, $372^8$, $380^5$.
English river, $440^4$.
Enstatite, $300^7$.
Epidote, $304^7$, $348^7$, $351^9$.
Erosion, paleozoic, $288^6$-$89^3$.
Erosion interval, surface topography at close of, $277^4$.

**Faults**, $403^5$-$12^1$; crossing Appalachian uplift, $422^1$; production of, $286^9$; as topographic features, $430^2$-$33^2$.
Feldspar, $295^9$, $297^3$, $299^9$, $300^7$, $301^1$, $304^4$, $304^7$, $309^2$, $309^7$, $309^9$, $313^1$, $313^5$, $313^7$, $319^4$, $319^5$, $320^6$, $321^4$, $326^7$, $328^3$, $328^8$, $329^2$, $334^4$, $336^4$, $337^3$, $337^8$, $338^7$, $339^2$, $348^3$, $348^6$, $349^2$, $349^4$, $349^9$, $351^8$, $352^2$, $352^4$, $352^5$, $352^7$, $354^7$, $354^9$, $355^2$, $356^2$, $356^7$, $395^6$, $396^2$; white, $311^1$.
Folds, $402^6$-$3^4$.
Foliation, $399^9$-$402^8$.
Fourchites, $396^2$.

**Gabbros**, $275^9$, $306^7$, $327^4$-$31^3$, $335^2$, $338^7$, $340^5$; analyses, $332^7$, $353^4$.
Garnet, $295^8$, $296^2$, $304^6$, $306^4$, $309^1$, $309^8$, $311^6$, $313^5$, $313^6$, $314^1$, $319^4$, $328^9$, $334^4$, $335^8$, $337^1$, $337^3$, $337^9$, $354^8$
Geologic history, summary of, $272^7$-$94^5$.
Glacial history, $292^8$-$93^9$.
Gneisses, $273^3$, $294^9$, $295^7$, $338^2$, $343^1$, $356^5$; analyses, $333^3$; doubtful, $299^6$-$303^3$.
Granites, $275^5$, $322^5$-$27^8$, $338^6$, $338^9$; foliation, $401^4$.
Graphite, $295^4$, $295^8$, $296^3$.
Grasse river, $439^1$.
Grenville rocks, $295^4$-$99^5$, $435^3$.

**Harpes** *sp.*, $366^9$.
antiquatus, $366^2$.
ottawaensis, $366^2$.
Helderberg submergence, $386^2$.
Hematite, $348^6$, $348^7$, $352^6$, $352^7$ $356^7$, $395^7$.
Hornblende, $296^5$, $300^2$, $300^6$, $301^1$, $304^9$, $309^7$, $309^6$, $309^9$, $310^1$, $311^4$, $313^3$, $314^1$, $314^9$, $315^8$, $319^4$, $323^6$, $326^7$, $328^9$, $329^8$, $330^7$, $334^4$, $335^4$, $336^4$, $337^3$, $337^7$, $348^6$, $352^5$, $396^2$, $396^7$.
Hoskins, L. M., cited, $401^9$.
Hudson river, $439^6$, $441^6$.
Hyperite, $330^7$; analyses, $332^6$, $353^4$.
Hypersthene, $300^7$, $304^5$, $305^2$, $309^7$, $309^9$, $312^9$, $313^3$, $313^6$, $313^9$, $319^4$, $328^3$, $329^8$.

**Igneous** activity, $287^7$-$88^5$.
Igneous intrusions, $275^4$.
Igneous rocks, $274^1$; foliation, $400^7$; paleozoic, $394^8$-$99^4$; late Precambric, $345^5$-$54^2$; of the upper Mohawk region, $397^5$-$98^6$.

**Illaenus** arcturus, $360^9$.
bayfieldi, $366^2$.
incertus, $366^3$.
Ilmenite, $304^5$, $304^9$, $305^2$, $309^8$, $328^5$.
Intrusives, metamorphosed condition of, $340^8$-$45^5$.
Iron ores, $311^6$.

**Joints**, $404^4$, $412^1$-$16^6$; production of, $286^6$.

**Kaolin**, $395^8$.
Kemp, J. F., cited, $297^4$, $298^7$, $306^7$, $308^8$, $310^6$, $314^7$, $317^8$, $317^3$, $329^9$, $330^6$, $346^2$, $349^1$, $349^8$, $350^5$, $393^8$, $395^1$, $395^8$, $395^9$, $396^9$, $397^6$, $397^3$, $398^4$, $405^1$, $415^6$; acknowledgments to, $271^6$.
Kolderup, cited, $339^1$.

**Labradorite**, $304^4$, $304^7$, $309^7$, $311^5$, $328^3$, $328^6$, $329^3$, $329^4$, $334^7$, $335^3$, $335^6$, $336^4$, $341^9$, $349^2$, $351^6$, $396^2$.
Lake belt, $429^2$-$30^2$.
Lakes, $445^5$-$48^7$.
Leeds, cited, $351^8$.
Leptaena fasciata, $366^8$.
Lichas minganensis, $366^9$.
Limestones, $273^8$, $295^4$.
Limonite, $395^8$.
Lingula huronensis, $366^2$.
Little Falls fault, $431^5$.
Lorraine formation, $384^6$-$86^1$.
Lowville (Birdseye) limestone, $283^6$, $369^4$-$71^4$, $391^1$.

**Maclurea** magna, $366^5$, $366^6$, $367^1$.
Magnetite, $300^2$, $300^8$, $313^5$, $319^4$, $325^4$, $326^7$, $328^3$, $328^6$, $328^8$, $334^4$, $335^7$, $336^3$, $337^2$, $348^6$, $349^2$, $351^7$, $352^4$, $352^5$, $354^8$, $355^2$, $356^3$, $396^6$, $398^2$; titaniferous, $304^5$, $306^7$.
Melilite, $398^2$.
Mesozoic base-leveling, $423^4$-$25^2$.
Mesozoic history, $289^8$-$90^6$.
Metamorphosed condition of the intrusives, $340^8$-$45^5$.
Microcline, $299^9$, $300^2$, $348^6$, $356^3$.
Microperthite, $297^4$, $299^9$, $300^2$, $304^6$, $313^5$, $313^6$, $313^7$, $313^8$, $319^5$, $320^8$, $321^4$, $326^7$, $336^4$, $338^7$, $339^5$, $348^6$, $352^4$, $352^5$, $352^7$, $356^8$.
Mohawk river, $438^8$.
Mohawk valley, faults, $410^2$, $431^1$.
Monadnocks, $426^8$, $427^6$.
Monchiquites, $396^2$.
Monticulipora, $367^4$.
Monzonite, analyses, $339^6$.
Morris granite, $326^5$-$27^8$.
Muscovite, $304^7$, $348^7$.

**Norite**, analyses, $332^6$, $334^8$.
North plain, $433^2$-$34^4$.
Northern hills and valleys, $434^4$-$37^5$.

**Ogilvie**, cited, $437^9$, $440^7$, $446^5$.
Oligoclase, $304^6$, $313^6$, $339^9$.
Olivin, $328^8$, $349^2$, $349^5$, $351^7$, $396^2$, $396^7$, $398^2$.
Olivin diabase, analyses, $351^3$.
Ophicalcite, $295^7$.
Orthis *sp.*, $365^9$, $366^7$.
costalis, $366^1$.
disparilis, $367^2$.
perveta, $366^9$, $367^1$.
platys, $366^8$.
porcia, $367^2$.
Orthoceras *sp.*, $365^9$, $366^7$, $367^3$.
Orthoclase, $300^2$, $313^8$, $334^4$, $335^7$, $336^3$, $337^2$, $348^6$, $352^5$.
Orton, cited, $364^6$, $380^6$, $384^8$, $388^6$.
Oswegatchie river, $439^1$.
Ottawa gneiss, $302^3$.
Ouachitite, $396^6$.

**Paleocystites** tenuiradiatus, $366^3$.
Paleozoic changes of level, $285^2$-$86^2$.
Paleozoic disturbances, $286^2$-$87^7$.
Paleozoic erosion, $288^6$-$89^2$.
Paleozoic faults, $405^6$-$12^1$.
Paleozoic history, early, $279^4$-$85^2$.
Paleozoic igneous activity, $287^7$-$88^5$.
Paleozoic igneous rocks, $394^8$-$99^4$.
Paleozoic oscillations of level, early, summary of, $386^9$-$94^7$.
Paleozoic rocks, $354^2$-$99^5$.

Paleozoic topography, $419^8$-$21^8$.
Peneplains, $417^8$, $425^2$-$27^2$.
Perkins, cited, $375^5$, $376^1$.
Perovskite, $398^2$.
Phlogopite, $295^5$, $296^5$.
Placoparia (Calymmene) multicosta, $367^8$.
Plagioclase, $329^8$, $336^4$.
Pleonaste, $329^6$.
Porphyry, $355^7$; syenite, $348^3$.
Postglacial history, $293^8$-$94^3$.
Potsdam formation, $279^9$-$81^1$, $354^2$-$60^7$, $387^1$-$88^7$; thickness, $358^6$.
Precambric disturbances, later, $278^1$.
Precambric erosion, $276^8$-$77^4$.
Precambric faulting, $403^9$-$5^3$.
Precambric history, $273^2$-$79^8$.
Precambric igneous activity, $278^4$-$79^3$.
Precambric igneous rocks, late, $345^5$-$54^2$.
Precambric rocks, $294^6$-$354^2$; foliation, $399^9$-$402^5$; joints, $404^4$.
Prepotsdam topography, $418^2$-$19^8$.
Prosser, cited, $363^7$, $372^1$, $372^3$, $373^4$, $377^3$, $377^8$, $378^6$, $379^4$, $384^5$, $392^2$, $411^3$.
Pyrite, $295^8$, $304^6$, $309^8$, $313^6$, $319^5$, $329^6$.
Pyroxenes, $295^5$, $295^8$, $296^4$, $300^7$, $301^3$, $305^1$, $309^9$, $311^4$, $314^9$, $315^8$, $323^5$, $328^9$, $330^7$, $337^7$, $349^3$, $398^2$.
Pyrrhotite, $304^6$, $309^8$, $329^6$.

**Quartz**, $295^5$, $297^3$, $300^2$, $304^6$, $309^7$, $309^8$, $309^9$, $311^6$, $313^5$, $313^6$, $313^8$, $314^2$, $319^4$, $321^4$, $323^5$, $326^7$, $328^9$, $334^4$, $335^8$, $337^2$, $338^1$, $338^6$, $348^6$, $352^5$, $352^6$, $352^7$, $355^2$, $356^1$, $356^7$, $395^6$, $395^8$.
Quartz augite syenite, $340^1$; analyses, $333^3$, $339^7$, $353^5$.
Quartz norite, analyses, $334^8$.
Quartz syenite porphyry, analyses, $353^5$.

**Raquette** river, $439^1$, $443^1$, $444^9$.
Rhynchonella plena, $367^4$.
Ridges, northern, $434^5$.
Ries, Heinrich, cited, $448^9$.
Rock structures, $399^5$-$416^8$.
Rome river, $442^2$.
Ruedemann, Rudolf, cited, $393^9$.

**Sacandaga** river, $439^5$, $441^5$.
St Lawrence valley, $438^4$.
St Regis river, $439^1$, $443^1$.
Saranac formation, $299^6$-$303^3$.
Saranac river, $439^8$, $440^4$, $442^9$, $443^6$.
Scapolite, $295^5$, $304^7$, $329^6$, $352^2$.
Schists, $273^8$, $295^7$.
Schroon river, $439^5$.
Scolitus minutus, $361^8$.
Seeley, cited, $361^2$, $365^4$, $374^8$, $376^4$, $383^4$.
Serpentine rocks, $295^6$.
Sillimanite, $295^8$, $296^3$.
Smyth, C. H. jr, cited, $302^8$, $315^4$, $316^8$, $317^3$, $329^9$, $330^8$, $346^4$, $388^8$, $397^3$, $398^3$, $447^9$; acknowledgments to, $271^6$.
Solenopora compacta, $367^3$.
Sphaerexochus parvus, $366^9$.
Spinel, $329^6$.
Stenopora, $367^5$.
Streams, $437^6$-$45^5$.
Strophomena *sp.*, $366^7$.
    incrassata, $367^2$.
Syenite porphyries, $348^3$, $354^1$, $355^7$; analyses, $351^3$, $353^5$.
Syenites, $275^8$, $312^2$-$22^5$, $338^9$, $340^4$, $346^7$; analyses, $333^1$, $336^5$, $339^6$; amount of differentiation of, $325^3$-$26^4$; granitic phase of, $323^3$-$25^3$; mineral composition, $313^4$-$14^4$; other areas, $316^9$-$18^9$; relation to anorthosite, $318^9$-$22^5$; variability of, $314^4$-$16^9$.

**Titanite**, $309^8$, $311^6$, $313^6$, $313^9$, $319^4$, $329^6$, $348^7$, $356^3$.
Titanium, $353^6$.
Topography, $416^7$-$48^8$; at close of erosion interval, $277^4$; paleozoic, $419^8$-$21^8$; Prepotsdam, $418^2$-$19^5$.
Tornebohm, cited, $330^7$.
Trachytes, $395^5$-$96^1$.
Tracy brook fault, $431^9$.
Trenton formation, $283^9$-$84^6$, $373^4$-$82^8$, $393^2$; thickness, $376^4$.

**Utica** formation, $284^6$-$85^3$, $382^8$-$84^7$, $393^6$-$94^5$.

**Valleys**, northern, $434^5$.
Van Hise, cited, $345^2$.
van Ingen, cited, $354^6$, $357^3$, $358^6$, $359^1$, $359^6$, $388^9$.
Vanuxem, cited, $373^4$.

**Walcott**, cited, $358^6$, $359^6$, $360^5$, $383^4$, $383^6$, $384^2$, $385^8$, $388^9$.
West Canada creek, $442^2$.
Westgate, cited, $438^4$.
White, T. G., cited, $371^7$, $372^8$, $373^9$, $374^8$, $375^9$, $376^5$, $379^2$, $379^4$, $383^3$.
Whitfield, cited, $362^8$.
Williams, G. H., cited, $397^8$.
Winchell, N. H., cited, $360^1$.
Woodworth, J. B., work of, $272^8$, $437^9$.

**Zircons**, $309^3$, $309^9$, $311^6$, $313^3$, $313^8$, $319^4$, $326^6$, $337^9$, $354^8$.
Zoisite, $304^7$.

*New York State Education Department*

## New York State Museum

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The annual reports of the early natural history survey, 1837-41, are out of print.

Reports 1-4, 1881-84, were published only in separate form. Of the 5th report 4 pages were reprinted in the 39th museum report, and a supplement to the 6th report was included in the 40th museum report. The 7th and subsequent reports are included in the 41st and following museum reports, except that certain lithographic plates in the 11th report (1891) and 13th (1893) are omitted from the 45th and 47th museum reports.

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In 1898 the paleontologic work of the State was made distinct from the geologic and was reported separately from 1899-1903. The two departments were reunited in 1904.

**Paleontologist's annual reports** 1899-1903.

*See* fourth note under Geologist's annual reports.

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**Entomologist's annual reports** on the injurious and other insects of the State of New York 1882-date.

Reports 3-19 bound also with museum reports 40-46, 48-57 of which they form a part. Since 1898 these reports have been issued as bulletins. Reports 3-4 are out of print, other reports with prices are:

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|---|---|---|---|---|---|
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| 7 | .20 | 13 | .10 | 19 ( " 21) | .15 |
| 8 | .25 | 14 (En 5) | .20 | 20 *In press* | |

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**Botanist's annual reports** 1867-date.

Bound also with museum reports 21-date of which they form a part; the first botanist's report appeared in the 21st museum report and is numbered 21. Reports 21-24, 29, 31-41 were not published separately.

Separate reports 25-28, 30, 42-50 and 52 (Botany 3), are out of print. Report 51 may be had for 40c; 53 for 20c; 54 for 50c. Since the 55th these reports have been issued as bulletins.

Descriptions and illustrations of edible, poisonous and unwholesome fungi of New York have been published in volumes 1 and 3 of the 48th museum report and in volume 1 of the 49th, 51st, 52d, 54th and 55th reports. The descriptions and illustrations of edible and unwholesome species contained in the 49th, 51st and 52d reports have been revised and rearranged, and, combined with others more recently prepared, constitute Museum memoir 4.

v. 4 Plates to accompany v. 3. Reptiles and Amphibia 23pl. Fishes 79pl. 1842.

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v. 5 pt5 Mollusca. 4+271p. 40pl. pt6 Crustacea. 70p. 13pl. 1843-44.

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DIVISION 2 BOTANY. Torrey, John. Flora of the State of New York; comprising full descriptions of all the indigenous and naturalized plants hitherto discovered in the State, with remarks on their economical and medical properties. 2v. il. pl. sq. Q. Albany 1843. *Out of print.*

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